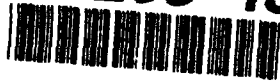


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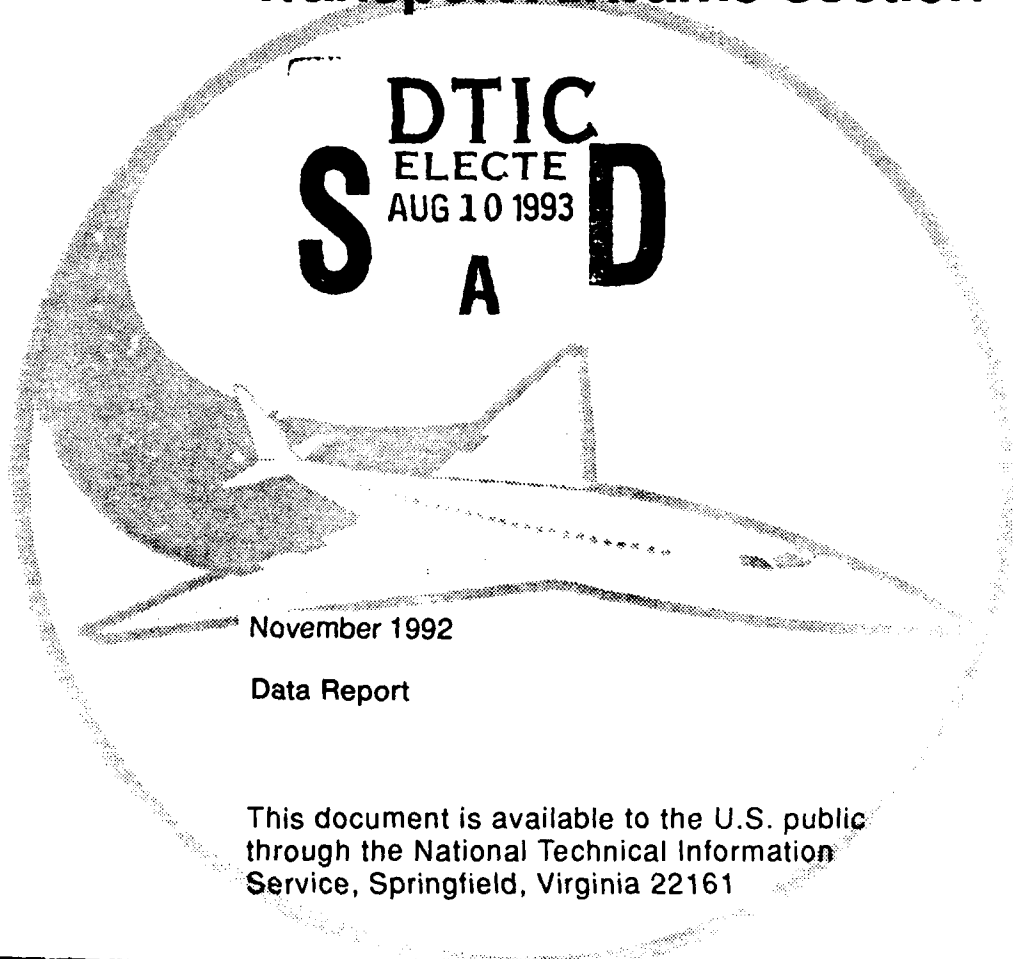
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FAA Technical Center
Atlantic City International Airport
N.J. 08405

Longitudinal Acceleration Test of Overhead Luggage Bins in a Transport Airframe Section

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November 1992

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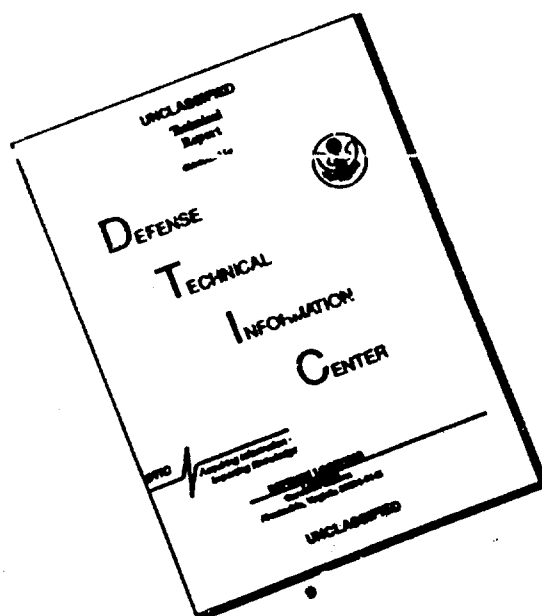
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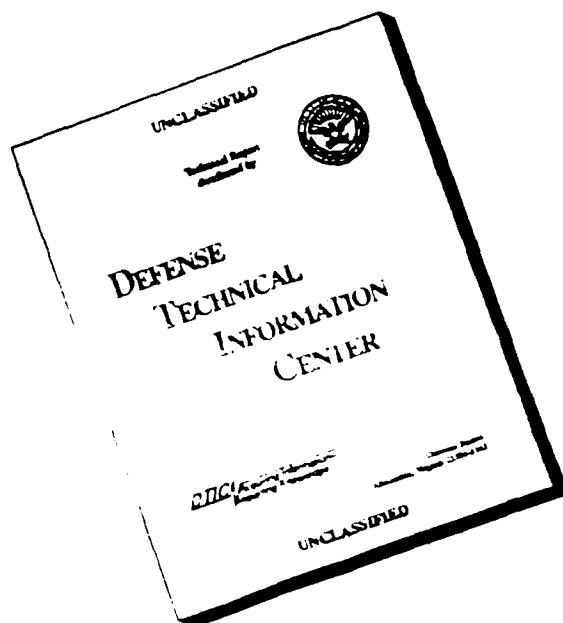
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16. Abstract A 10-foot transport airframe section was longitudinally tested at the Transportation Research Center (TRC) Inc. The purpose of the test was to measure the structural responses of and the interaction between the overhead storage bins and fuselage under simulated, potentially survivable, impact conditions. Three tests were conducted using the TRC 24-inch Hyge Shock Tester. The first test attained a peak acceleration of 5.9 g and a velocity change of 30.7 ft/sec. The second test reached 8.8 g and 37.5 ft/sec. The third test resulted in 13.2 g and 42.3 ft/sec. The input acceleration pulses were triangular in shape. The airframe test section was configured with two triple passenger seats in two rows on the left side, four anthropomorphic test dummies (ATD), a 60-inch overhead storage bin (Bin A) on the right side, and a 20- by 20-inch set of overhead storage bins (Bin B) on the left side.			
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TABLE OF CONTENTS

	PAGE
EXECUTIVE SUMMARY	ix
INTRODUCTION	1
DESCRIPTION	2
TEST ARTICLE	2
FACILITY AND TEST METHOD	4
INSTRUMENTATION	5
DISCUSSION	7
TEST DATA	7
DATA EXPLANATIONS	7
POST-TEST OBSERVATIONS	8
SUMMARY OF RESULTS	15
REFERENCES	16
APPENDICES	
A - INSTRUMENTATION LIST	A-1
B - DATA PLOTS	B-1
C - CALIBRATION DATA	C-1
D - FACILITY DESCRIPTION	D-1

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LIST OF ILLUSTRATIONS

FIGURE	DESCRIPTION	PAGE
OVERALL AND INSTRUMENTATION VIEWS		
1.	AIRFRAME TEST SECTION/FLOOR PLAN	18
2.	BIN 'B' INSTRUMENTATION LOCATIONS, TEST 001	19
3.	BIN 'B' INSTRUMENTATION LOCATIONS, TEST 002	20
4.	BIN 'B' INSTRUMENTATION LOCATIONS, TEST 003	21
5.	BIN 'A' INSTRUMENTATION LOCATIONS, TEST 001	22
6.	BIN 'A' INSTRUMENTATION LOCATIONS, TESTS 002 AND 003	23
7.	FUSELAGE INSTRUMENTATION LOCATIONS	24
TEST 001		
8.	PRE-TEST OVERALL LEFT SIDE VIEW	26
9.	PRE-TEST OVERALL FRONT VIEW	26
10.	PRE-TEST OVERALL RIGHT SIDE VIEW	27
11.	PRE-TEST OVERALL REAR VIEW	27
12.	PRE-TEST BIN 'B' OVERALL SIDE VIEW	28
13.	PRE-TEST BIN 'B' BALLAST POSITION	28
14.	PRE-TEST BIN 'B' REAR ANGLE VIEW	29
15.	PRE-TEST BIN 'B' LINKS 4 AND 5	29
16.	PRE-TEST BIN 'B' LINK 4 CLOSE-UP	30
17.	PRE-TEST BIN 'B' LINK 3 CLOSE-UP	30
18.	PRE-TEST BIN 'B' LINK 2	31
19.	PRE-TEST BIN 'B' LINK 1 CLOSE-UP	31
20.	PRE-TEST BIN 'B' LINKS 15, 16, 23, AND 24	32
21.	PRE-TEST BIN 'B' LINK 32	32
22.	PRE-TEST BIN 'B' LINKS 13, 14, 21, AND 22	33
23.	PRE-TEST BIN 'A' OVERALL SIDE VIEW	33
24.	PRE-TEST BIN 'A' SIDE VIEW CLOSE-UP	34
25.	PRE-TEST BIN 'A' BALLAST POSITION	34
26.	PRE-TEST BIN 'A' FORWARD STRUCTURE FRONT ANGLE VIEW	35
27.	PRE-TEST BIN 'A' FRONT SUPPORT BAR	35

LIST OF ILLUSTRATIONS, CONT'D.

FIGURE	DESCRIPTION	PAGE
28.	PRE-TEST BIN 'A' LINKS 3 AND 4	36
29.	PRE-TEST BIN 'A' LINKS 5 AND 6	36
30.	PRE-TEST BIN 'A' REAR STRUCTURE REAR ANGLE VIEW	37
31.	PRE-TEST BIN 'A' REAR SUPPORT BAR	37
32.	PRE-TEST BIN 'A' LINKS 7 AND 8	38
33.	PRE-TEST BIN 'A' LINK 13	38
34.	PRE-TEST BIN 'A' LINKS 9, 10, AND 14	39
35.	PRE-TEST SEATS AND DUMMIES FRONT ANGLE VIEW	39
36.	PRE-TEST FRONT SEAT/FLOOR ATTACHMENT	40
37.	PRE-TEST REAR SEAT/FLOOR ATTACHMENT	40
38.	POST-TEST BIN 'B' FRONT ANGLE VIEW	41
39.	POST-TEST BIN 'B' BALLAST POSITION	41
40.	POST-TEST BIN 'B' OVERALL SIDE VIEW	42
41.	POST-TEST BIN 'B' REAR ANGLE VIEW	42
42.	POST-TEST BIN 'B' UNDERSIDE	43
43.	POST-TEST BIN 'B' FORWARD UNDERSIDE PANEL	43
44.	POST-TEST BIN 'B' FORWARD UNDERSIDE PANEL-FORWARD LATCH CLOSE-UP	44
45.	POST-TEST BIN 'B' LINKS 4, 5, AND 6	44
46.	POST-TEST BIN 'B' LINK 4	45
47.	POST-TEST BIN 'B' LINK 2 CLOSE-UP	45
48.	POST-TEST BIN 'B' LINKS 16 AND 24	46
49.	POST-TEST BIN 'B' LINK 16 CLOSE-UP	46
50.	POST-TEST BIN 'B' FORWARD 20" BIN DRAG LINK FITTING/ FUSELAGE CONTACT	47
51.	POST-TEST BIN 'B' LINKS 15 AND 23	47
52.	POST-TEST BIN 'B' LINK 32	48
53.	POST-TEST BIN 'B' LINK 32 BIN ATTACHMENT	48
54.	POST-TEST BIN 'B' LINKS 13, 14, 21, AND 22	49
55.	POST-TEST BIN 'B' LINKS 14 AND 22	49
56.	POST-TEST BIN 'B' LINK 14 CLOSE-UP	50
57.	POST-TEST BIN 'B' REAR 20" BIN DRAG LINK FITTING/ FUSELAGE CONTACT	50

LIST OF ILLUSTRATIONS, CONT'D.

FIGURE	DESCRIPTION	PAGE
58.	POST-TEST BIN 'B' LINKS 13 AND 21	51
59.	POST-TEST BIN 'B' LINK 13 CLOSE-UP	51
60.	POST-TEST BIN 'A' BALLAST POSITION	52
61.	POST-TEST BIN 'A' FORWARD STRUCTURE FRONT ANGLE VIEW	52
62.	POST-TEST BIN 'A' FRONT SUPPORT BAR	53
63.	POST-TEST BIN 'A' REAR STRUCTURE REAR ANGLE VIEW	53
64.	POST-TEST BIN 'A' REAR SUPPORT BAR	54
65.	POST-TEST SEATS AND DUMMIES FRONT ANGLE VIEW	54
66.	POST-TEST SEATS AND DUMMIES SIDE VIEW	55
67.	POST-TEST SEAT/FLOOR ATTACHMENTS	55
68.	POST-TEST REAR DUMMY CONTACT WITH FRONT SEAT	56
69.	POST-TEST BIN 'B' LINKS 1, 2, 3, 4, 5, 6, 13, 14, 15, 16, 21, 22, 23, 24, AND 32 REMOVED FROM TEST FIXTURE	56
70.	POST-TEST LINKS 2, 4, 13, 14, 15, AND 16 REMOVED FROM TEST FIXTURE	57
71.	POST-TEST BIN 'B' LINK 2 CLOSE-UP REMOVED FROM TEST FIXTURE	57
72.	POST-TEST BIN 'B' LINK 4 CLOSE-UP REMOVED FROM TEST FIXTURE	58
73.	POST-TEST BIN 'B' LINK 13 CLOSE-UP REMOVED FROM TEST FIXTURE	58
74.	POST-TEST BIN 'B' LINK 14 CLOSE-UP REMOVED FROM TEST FIXTURE	59
75.	POST-TEST BIN 'B' LINK 15 CLOSE-UP REMOVED FROM TEST FIXTURE	59
76.	POST-TEST BIN 'B' LINK 16 CLOSE-UP REMOVED FROM TEST FIXTURE	60
TEST 002		
77.	PRE-TEST OVERALL LEFT SIDE VIEW	62
78.	PRE-TEST OVERALL FRONT VIEW	62
79.	PRE-TEST OVERALL RIGHT SIDE VIEW	63
80.	PRE-TEST OVERALL REAR VIEW	63
81.	PRE-TEST BIN 'B' OVERALL SIDE VIEW	64
82.	PRE-TEST BIN 'B' ACCELEROMETER POSITION	64
83.	PRE-TEST BIN 'B' LINK 8	65
84.	PRE-TEST BIN 'B' LINK 7	65

LIST OF ILLUSTRATIONS, CONT'D.

FIGURE	DESCRIPTION	PAGE
85.	PRE-TEST BIN 'B' LINKS 17 AND 25	66
86.	PRE-TEST BIN 'B' LINK 32 AND BIN MOUNT EXTERIOR REINFORCEMENT PLATE	66
87.	PRE-TEST BIN 'B' 60" BIN DRAG LINK MOUNT INTERIOR REINFORCEMENT PLATE	67
88.	PRE-TEST BIN 'B' LINKS 18 AND 28	67
89.	PRE-TEST BIN 'A' BALLAST POSITION	68
90.	PRE-TEST BIN 'A' UNDERSIDE	68
91.	PRE-TEST BIN 'A' ACCELEROMETER POSITION	69
92.	PRE-TEST BIN 'A' FORWARD STRUCTURE FRONT ANGLE VIEW	69
93.	PRE-TEST BIN 'A' LINKS 5 AND 6	70
94.	PRE-TEST BIN 'A' REAR STRUCTURE REAR ANGLE VIEW	70
95.	PRE-TEST BIN 'A' LINKS 9, 10, AND 14	71
96.	POST-TEST BIN 'B' BALLAST POSITION	71
97.	POST-TEST BIN 'B' FORWARD LOWER LATERAL LINKS	72
98.	POST-TEST BIN 'B' REAR LOWER LATERAL LINKS	72
99.	POST-TEST BIN 'B' LINKS 17 AND 25	73
100.	POST-TEST BIN 'B' LINK 32	73
101.	POST-TEST BIN 'B' LINKS 18 AND 25	74
102.	POST-TEST BIN 'B' 60" BIN INTERIOR	74
103.	POST-TEST BIN 'B' 60" BIN FORWARD PANEL INTERIOR	75
104.	POST-TEST BIN 'B' 60" BIN DRAG LINK MOUNT INTERIOR REINFORCEMENT PLATE	75
105.	POST-TEST BIN 'A' OVERALL REAR ANGLE VIEW	76
106.	POST-TEST BIN 'A' BALLAST POSITION	76
107.	POST-TEST BIN 'A' FORWARD PANEL INTERIOR	77
108.	POST-TEST BIN 'A' FORWARD PANEL REAR VIEW	77
109.	POST-TEST BIN 'A' FORWARD STRUCTURE SIDE VIEW	78
110.	POST-TEST BIN 'A' FORWARD PANEL FRONT VIEW	78
111.	POST-TEST BIN 'A' FORWARD PANEL FRONT INBOARD 3/4 VIEW	79
112.	POST-TEST BIN 'A' FORWARD PANEL FRONT OUTBOARD 3/4 VIEW	79
113.	POST-TEST BIN 'A' FRONT SUPPORT BAR	80

LIST OF ILLUSTRATIONS, CONT'D.

FIGURE	DESCRIPTION	PAGE
114.	POST-TEST BIN 'A' REAR STRUCTURE REAR ANGLE VIEW	80
115.	POST-TEST BIN 'A' REAR SUPPORT BAR	81
116.	POST-TEST SEATS AND DUMMIES FRONT ANGLE VIEW	81
TEST 003		
117.	PRE-TEST OVERALL LEFT SIDE VIEW	83
118.	PRE-TEST FRONT VIEW	83
119.	PRE-TEST OVERALL RIGHT SIDE VIEW	84
120.	PRE-TEST REAR VIEW	84
121.	PRE-TEST BIN 'B' LINK 30	85
122.	PRE-TEST BIN 'A' BALLAST POSITION	85
123.	PRE-TEST BIN 'A' FOAM/WOOD LOAD DISTRIBUTORS	86
124.	PRE-TEST SEATS AND DUMMIES FRONT ANGLE VIEW	86
125.	PRE-TEST SEATS AND DUMMIES SIDE VIEW	87
126.	PRE-TEST SEATS AND DUMMIES REAR ANGLE VIEW	87
127.	PRE-TEST FRONT SEAT REAR VIEW	88
128.	PRE-TEST FRONT SEAT CENTER SEAT BACK REAR VIEW	88
129.	POST-TEST BIN 'B' BALLAST POSITION	89
130.	POST-TEST BIN 'B' FORWARD UNDERSIDE PANEL SIDE VIEW	89
131.	POST-TEST BIN 'B' REAR UNDERSIDE PANEL FRONT VIEW	90
132.	POST-TEST BIN 'B' FORWARD UNDERSIDE PANEL ACCESS DOOR	90
133.	POST-TEST BIN 'B' FORWARD 20" BIN/CENTER 60" BIN LOWER INTERFACE	91
134.	POST-TEST BIN 'B' FORWARD LOWER LATERAL LINKS	91
135.	POST-TEST BIN 'B' LINK 8	92
136.	POST-TEST BIN 'B' REAR LOWER LATERAL LINKS	92
137.	POST-TEST BIN 'B' LINKS 17, 25 AND FORWARD UPPER LINKS	93
138.	POST-TEST BIN 'B' FORWARD UPPER LINKS	93
139.	POST-TEST BIN 'B' LINKS 17 AND 25	94
140.	POST-TEST BIN 'B' LINKS 17 AND 25 REAR ANGLE CLOSE-UP	94
141.	POST-TEST BIN 'B' 60" BIN FORWARD PANEL TOP EDGE OUTBOARD DAMAGE	95

LIST OF ILLUSTRATIONS, CONT'D.

FIGURE	DESCRIPTION	PAGE
142.	POST-TEST BIN 'B' 60" BIN FORWARD PANEL TOP EDGE CENTER DAMAGE	95
143.	POST-TEST BIN 'B' LINK 30	96
144.	POST-TEST BIN 'B' 60" BIN DRAG LINK EXTERIOR REINFORCEMENT PLATE, FORWARD EDGE	96
145.	POST-TEST BIN 'B' 60" BIN DRAG LINK FITTING/FUSELAGE CONTACT OVERALL SIDE VIEW	97
146.	POST-TEST BIN 'B' 60" BIN DRAG LINK FITTING/FUSELAGE CONTACT FRONT ANGLE VIEW	97
147.	POST-TEST BIN 'B' 60" BIN DRAG LINK FITTING/FUSELAGE CONTACT, UPPER MARKS ON FUSELAGE	98
148.	POST-TEST BIN 'B' 60" BIN DRAG LINK FITTING/FUSELAGE CONTACT, LOWER MARKS ON FUSELAGE	98
149.	POST-TEST BIN 'B' 60" BIN DRAG LINK FITTING/FUSELAGE CONTACT, MARKS ON DRAG LINK FITTING	99
150.	POST-TEST BIN 'B' LINKS 18, 28, AND REAR UPPER LINKS	99
151.	POST-TEST BIN 'B' 60" BIN FORWARD PANEL INTERIOR	100
152.	POST-TEST BIN 'B' 60" BIN DRAG LINK INTERIOR REINFORCEMENT PLATE	100
153.	POST-TEST BIN 'A' BALLAST POSITION	101
154.	POST-TEST BIN 'A' BALLAST DAMAGE	101
155.	POST-TEST BIN 'A' FORWARD PANEL INTERIOR	102
156.	POST-TEST BIN 'A' FORWARD PANEL EXTERIOR	102
157.	POST-TEST BIN 'A' FORWARD STRUCTURE FRONT ANGLE VIEW	103
158.	POST-TEST BIN 'A' FRONT SUPPORT BAR	103
159.	POST-TEST BIN 'A' REAR STRUCTURE REAR ANGLE VIEW	104
160.	POST-TEST BIN 'A' REAR SUPPORT BAR SHEAR PIN, REMOVED	104
161.	POST-TEST SEATS, DUMMIES, AND BIN 'B' FRONT ANGLE VIEW	105
162.	POST-TEST SEATS AND DUMMIES SIDE VIEW	105
163.	POST-TEST SEATS AND DUMMIES REAR ANGLE VIEW	106
164.	POST-TEST FRONT SEAT OUTBOARD SEAT BACK REAR DUMMY CONTACT	106
165.	POST-TEST FRONT SEAT CENTER SEAT BACK REAR DUMMY CONTACT	107

LIST OF TABLES

TABLE	DESCRIPTION	PAGE
1.	AIRFRAME TEST SECTION INSTALLATION WEIGHT	3
2.	INSTRUMENTATION	6
3.	PRELOAD DATA SUMMARY	10
4.	DATA SUMMARY	12

EXECUTIVE SUMMARY

A ten-foot transport airframe section was longitudinally tested at the Transportation Research Center Inc. (TRC). The purpose of the test was to measure the structural responses of and the interaction between the overhead storage bins and the fuselage under simulated, potentially survivable, impact conditions. Three tests were conducted using the TRC 24-inch Hyge Shock Tester. The first test attained a peak acceleration of 5.9 g and a velocity change of 30.7 ft/sec. The second test reached 8.8 g and 37.5 ft/sec. The third test resulted in 13.2 g and 42.3 ft/sec. The input acceleration pulses were triangular in shape. The airframe test section was configured with two triple passenger seats in two rows on the left side, four anthropomorphic test dummies (ATD), a 60-inch overhead storage bin (Bin 'A') on the right side, and a 20-inch/60-inch/20-inch set of overhead storage bins (Bin 'B') on the left side.

Acceleration measurements were obtained from the instrumented fuselage and the overhead storage bins. Load measurements were obtained from the overhead storage bin attachment links. Peak longitudinal floor acceleration levels were 6.6 g in the front and 6.5 g in the rear for the first test, 9.3 g front and rear in the second test, and 15.0 g in the front and 15.3 g in the rear for the third test. Both triple seats remained locked in their tracks during the tests. The four test dummies were positioned in the outboard and center positions of their respective seats. The ATD's were totally restrained during all three tests.

The seats were provided by Weber Aircraft through a company developmental program. The seats and their response performances are not part of this test program and, therefore, are not documented in detail in this report.

INTRODUCTION

This longitudinal acceleration test is one in a series of section and full-scale tests conducted in support of the Federal Aviation Administration's (FAA) current Crash Dynamics and Engineering Development Program (Reference 1). Such tests included the Full-Scale Transport Controlled Impact Demonstration (Reference 2) and subsequent Vertical Drop Test of a Transport Airframe Section (Reference 3).

The objective of this test was to determine the interaction between and the performance of a transport airplane fuselage section and the overhead storage bins under simulated longitudinal impact conditions which are considered potentially survivable. Response data obtained from these tests will be used to determine the dynamic response characteristics of the airframe installation and to calibrate analytical computer programs such as the lumped mass model "KRASH" (Reference 4).

Tests conducted at the Transportation Research Center Inc. Impact Simulator Test Facility involved a ten-foot-long airframe section (Figure 1) which was longitudinally impact tested at peak acceleration levels of 5.9 g (30.7 ft/sec), 8.8 g (37.5 ft/sec), and 13.2 g (42.3 ft/sec), respectively. The airframe section contained two cabin triple seats, four dummy occupants, an empty auxiliary fuel tank/cradle assembly, and two sets of overhead storage bins. Structural response data were obtained during the test from instrumentation installed on the fuselage structure and the overhead storage bins. The location of this instrumentation is detailed in Appendix A and Figures 2 through 7. The graphs of recorded acceleration and load responses are presented in Appendix B, with calibration data contained in Appendix C. Appendix C also presents data and photographs from static pull tests that were conducted on the overhead storage bins prior to the subject longitudinal acceleration tests.

DESCRIPTION

TEST ARTICLE

The airframe test article was a ten-foot section cut from the aft fuselage of a B707 transport airplane. As shown in Figure 1, the section structure, which is characterized by a tapered lower fuselage shell area, was separated just forward of the rear galley between body stations (BS) 1120 and 1240. The section was configured with two rows of triple passenger seats on the left side only, an auxiliary fuel tank at BS1173, a 60-inch overhead storage bin (referred to as Bin 'A') on the right side between BS1120 and BS1200, and a 20-inch/60-inch/20-inch series of overhead storage bins (referred to as Bin 'B') on the left side between BS1120 and BS1240.

To ensure structural integrity and the elimination of inherent open-end effects, the section floor structure was modified by reinforcing the end floor beams and by adding additional beams at BS 1120 and 1240. These new beams and existing beams were tied together with five longitudinal hat section stringers. These stringers replaced the original under-floor cargo liner attachment members which had been inadvertently removed. These members also provided for stability of the floor beams. In addition, the shear strength provided by the outboard floor panel attachment fasteners was increased by doubling the number of fasteners around the periphery of each outboard panel.

Table 1 provides a list of the airframe section and equipment installation weights. Excluding the onboard equipment (i.e., seats, dummies, etc.) the bare airframe section weighed 1900 pounds. The total weight of the test section with seats, dummies, fuel tank, and overhead storage bins (filled with 200 and 160 pounds of ballast in Bin 'A' and Bin 'B', respectively) was 3496 pounds.

TABLE 1

AIRFRAME TEST SECTION INSTALLATION WEIGHT

ITEM	DESCRIPTION	TOTAL WEIGHT (LBS.)
AIRFRAME SECTION	BS1120 TO BS 1240	1900
FUEL TANK/CRADLE	SARGENT FLETCHER CO. PART NO. 72429/37-330-48160-203	300 (approx. empty wt.)
FRONT SEAT	THREE PASSENGER	80
REAR SEAT	THREE PASSENGER	56
WINDOW DUMMY (FRONT SEAT)	DOT PART 572, SUBPART B	165
CENTER DUMMY (FRONT SEAT)	DOT PART 572, SUBPART B	165
WINDOW DUMMY (REAR SEAT)	DOT PART 572, SUBPART B	165
CENTER DUMMY (REAR SEAT)	DOT PART 572, SUBPART B	165
OVERHEAD STORAGE BIN (INCLUDING BALLAST)	BIN 'A'	250
OVERHEAD STORAGE BIN (INCLUDING BALLAST)	BIN 'B'	250

FACILITY AND TEST METHOD

The test specimen was longitudinally tested at the Transportation Research Center Inc. Impact Simulator Facility. A description of the facility is contained in Appendix D.

A test fixture was designed and fabricated to attach the fuselage section to the test sled. The critical design constraints were to keep the weight to a minimum and to minimize the effect of the fixture on the structural integrity of the airframe by not altering the floor-fuselage shell interface load path. Refer to "Longitudinal Impact Test of a Transport Airframe Section" (Reference 5) for a detailed description of the test fixture.

Three tests were conducted. The first test was conducted with a peak acceleration level of 5.9 g, the second with a peak acceleration level of 8.8 g, and the third with a peak acceleration level of 13.2 g. Nine high-speed cameras (500 frames per second), one real-time camera, and one video tape camera were used to document each longitudinal impact. Seven of the high-speed cameras were onboard. The other two high-speed cameras, the real-time camera, and the video tape camera viewed the test from various positions along the test track. The onboard camera locations are shown in Figures 8 through 11.

INSTRUMENTATION

The airframe section and overhead storage bins were instrumented with accelerometers. The attachment links for the overhead storage bins were instrumented with strain gages. Tables 2 through 7 identify the accelerometers and strain gages used in Tests 001, 002, and 003. The location of the overhead storage bin accelerometers changed between Test 001 and Test 002. Their locations are documented in Figures 2 through 6. Triaxial accelerometers were mounted on the inboard seat track on the right side at BS 1120 and BS 1240.

Test method and results of the static calibrations are described in Appendix C. These static tests involved longitudinally loading the overhead storage bins and measuring the overall pull force and corresponding load on each instrumented link. These data were compared with the data generated in static tests of the links conducted at the FAA Technical Center prior to this test program.

TABLE 2
INSTRUMENTATION

	Accelerometer			Strain	Channels
	Long.	Lat.	Vert.	Gage	
Fuselage	4	-	4	-	8
Floor	2	2	2	-	6
Overhead Storage Bin A*	1**	1**	1**	-	3
Overhead Storage Bin B*	1**	1**	1**	-	3
Overhead Storage Bin A* Attachment Links	-	-	-	11	11
Overhead Storage Bin B* Attachment Links	-	-	-	15 (7)***	15 (7)***
Drive Fixture/Sled	2	-	-	-	2
TOTAL					48 (40)***

*Bin A designates the right side 60-inch length overhead storage bin.

Bin B designates the left side 20-inch/60-inch/20-inch series of overhead storage bins.

**Test 001 accelerometer locations are different from Test 002 and 003 accelerometer locations. See Figures 2 through 6.

*** () Indicates information for Tests 002 and 003.

DISCUSSION

TEST DATA

The airframe test section was longitudinally tested at low-, intermediate-, and high energy impact conditions.

The first test (001) involved subjecting the airframe and its contents to a 5.9 g peak acceleration. Figures 8 through 76 illustrate the pre- and post-test conditions. No visual evidence of any deformation of the fuselage structure was observed following this test. Damage was incurred on both Bin 'A' and Bin 'B' and is documented in the post-test observations section.

In the second test (002), the airframe and its contents were subjected to an 8.8 g peak acceleration. Pre- and post-test photographs are shown in Figures 77 through 116. No visible evidence of deformation or damage to the fuselage or test fixture was observed. Damage was noted on Bin 'B' and is documented in the post-test observations section.

The airframe and its contents were subjected to a 13.2-g peak acceleration in the third test (003). The pre- and post-test conditions are illustrated in Figures 117 through 165. The fuselage and test fixture suffered no significant visible damage or deformation. Overhead storage bin damage is again documented in the post-test observations section.

DATA EXPLANATIONS

Prior to each test, the overhead storage bins were emptied and the link load channels were zeroed. Ballast was then added to the bins, and a preload recorded for each instrumented link. These preload values are listed in Table 3. Peak data values and their time of occurrence are listed in Table 4.

TEST 001

In Test 001 fourteen fuselage accelerations, six overhead storage bin accelerations (three each on Bin 'A' and Bin 'B'), eleven link loads on Bin 'A', fifteen link loads on Bin 'B', and two sled accelerations were recorded. Instrumentation locations are shown in Figures 2, 5, and 7.

TEST 002

In Test 002 fourteen fuselage accelerations, six overhead storage bin accelerations (three on Bin 'A' and three on Bin 'B'), eleven link loads on Bin 'A', seven link loads on Bin 'B', and two sled accelerations were recorded. Figures 3, 6, and 7 document the instrumentation locations. Note the repositioning of the Bin 'A' and Bin 'B' accelerometers. The links on Bin 'B', except link 32, were replaced. Links 3, 4, 14, 15, 22, and 23 were replaced with 7, 8, 18, 17, 28, and 25, respectively. All other Bin 'B' links were replaced with non-instrumented links.

TEST 003

In Test 003 fourteen fuselage accelerations, three Bin 'A' accelerations, three Bin 'B' accelerations, eleven Bin 'A' link loads, seven Bin 'B' link loads, and two sled accelerations were recorded. Instrumentation locations are noted in figures 4, 6, and 7. Link 32 on Bin 'B' was replaced with link 30 for this test.

POST-TEST OBSERVATIONS

Test 001

The front support bar of Bin 'A' bent slightly during the test. A new rear support bar and shear pin were fitted for the remaining tests as a precaution because they are the primary load restraint.

The drag link fitting on the central 60-inch portion of Bin 'B' pulled out of the bin top material. As a result, lower lateral links 2 and 4 and upper outboard links 13, 14, 15, and 16 broke. Figures 38 through 59 and 69 through 76 show the Bin 'B' damage. The drag link attachment was repaired and reinforced by sandwiching the bin top between two 8- by 12-inch steel plates. The plates were bonded to the bin using Devcon Gel 5-Minute Epoxy. Longer bolts for the drag link fitting were used and run through the top plate, bin top, and lower plate. The top plate was 0.090-inch thick and the bottom plate was 0.125-inch thick. The drag link bin fittings on the forward and rear 20-inch bins contacted the fuselage, as depicted in Figures 50 and 57.

Test 002

The front panel on Bin 'A' began to crack around the access hole cut for the calibration tests. Two horizontal cracks developed, one on each side of the hole, each approximately one half-inch in length. Two creases formed around the outboard rib of the front panel, approximately four and one half inches above the lower edge of the bin. Figures 107 through 112 illustrate the front panel damage. Foam and plywood were positioned between the ballast and the front panel for the third test to more evenly distribute the ballast load, as shown in Figure 123.

Both the front and rear underside panels on Bin 'B' opened during the test. No damage was noted on the links, but the drag link on the 60-inch bin was replaced as a precaution prior to the third test. Figures 96 through 104 document the bin post-test condition.

Test 003

No further damage was noted to Bin 'A'. Figures 153 through 160 demonstrate the post-test condition of the bin, links, and ballast.

The forward panel of the 60-inch bin of Bin 'B' separated from the rest of the bin along the top and approximately halfway down its outboard edge. The crack and the resulting damage are shown in Figures 139 through 142 and Figures 151 through 152. The leading edge of the top drag link fitting reinforcement plate began to separate from the bin, as depicted in Figure 144. The drag link fitting also contacted the fuselage. Figures 145 through 149 show the contact marks. The outboard, forward upper link and a lower lateral link, link number 8, broke during the test. Figures 135 and 138 display the damaged links.

TABLE 3

PRELOAD DATA SUMMARY

APPROXIMATELY 160 LBS. OF BALLAST
OVERHEAD STORAGE BIN B LINK LOADS (LBS.)

CHANNEL	001	002	003
LINK NO. 3	-40.4	-26.1	7.5
LINK NO. 4	4.7	2.0	7.5
LINK NO. 5	11.2	6.0	5.2
LINK NO. 6	26.9	51.4	48.0
LINK NO. 7	10.5	3.3	3.6
LINK NO. 8	-33.2	-27.8	-22.2
LINK NO. 9	0.0	-7.4	-6.2
LINK NO. 10	11.7	15.0	14.2
LINK NO. 11	-78.8	-69.0	-70.8
LINK NO. 12	-28.1	-23.1	-22.5
LINK NO. 13	-32.1	2.8	-4.0

NOTE: TENSION IS POSITIVE

TABLE 3

PRELOAD DATA SUMMARY, CONT'D.

APPROXIMATELY 200 LBS. OF PALLAST
OVERHEAD STORAGE BIN B LINK LOADS (LBS.)

CHANNEL	001	002	003
LINK NO. 1	1.5	---	---
LINK NO. 2	-9.3	---	---
LINK NO. 3	18.5	---	---
LINK NO. 4	10.6	---	---
LINK NO. 5	-20.3	---	---
LINK NO. 6	6.0	---	---
LINK NO. 13	1.2	---	---
LINK NO. 14	37.1	---	---
LINK NO. 15	50.5	---	---
LINK NO. 16	4.3	---	---
LINK NO. 21	.2	---	---
LINK NO. 22	33.3	---	---
LINK NO. 23	47.8	---	---
LINK NO. 24	2.4	---	---
LINK NO. 32	8.0	6.8	---
LINK NO. 7	---	-1.7	12.9
LINK NO. 8	---	21.0	28.8
LINK NO. 17	---	39.9	29.0
LINK NO. 18	---	11.2	22.3
LINK NO. 25	---	57.9	65.4
LINK NO. 28	---	57.8	50.8
LINK NO. 30	---	---	3.5

NOTE: TENSION IS POSITIVE

TABLE 4
DATA SUMMARY

CHANNEL	001		002		003	
	MAXIMUM	TIME	MAXIMUM	TIME	MAXIMUM	TIME
<hr/> PEAK ACCELERATIONS (g) AND VELOCITIES (ft/sec) <hr/>						
SLED LONGITUDINAL	5.9	116.0	8.8	103.1	13.2	84.8
VELOCITY	30.7	361.1	37.5	303.6	42.3	243.4
FLOOR FORWARD LONG.	6.6	119.5	9.3	99.4	15.0	84.9
VELOCITY	30.3	358.5	37.2	302.2	42.4	252.5
FLOOR FORWARD LATERAL	0.8	220.2	1.4	286.8	2.6	221.9
FLOOR FORWARD VERTICAL	1.8	22.4	6.1	308.8	14.3	251.2
FLOOR FORWARD RESULTANT	6.6	119.5	9.4	99.4	15.3	84.2
FLOOR AFT LONGITUDINAL	6.5	118.8	9.3	97.8	15.3	79.6
VELOCITY	29.4	358.1	37.5	300.6	42.3	253.6
FLOOR AFT LATERAL	0.8	227.5	1.4	263.4	2.8	246.6
FLOOR AFT VERTICAL	1.4	327.5	3.7	293.4	6.2	241.6
FLOOR AFT RESULTANT	6.6	118.8	9.7	97.6	15.3	79.6
FUSELAGE TOP BS 1200						
LONGITUDINAL	10.3	133.5	11.2	94.2	17.5	112.8
FUSELAGE TOP BS 1200						
VERTICAL	5.0	248.6	3.5	304.0	9.8	141.9
FUSELAGE STARBOARD						
BS 1180 LONGITUDINAL	7.8	202.8	10.4	108.1	16.2	81.6
FUSELAGE STARBOARD						
BS 1180 VERTICAL	1.4	195.6	1.8	280.4	2.9	237.4
FUSELAGE TOP BS 1240						
LONGITUDINAL	8.8	169.4	12.0	95.6	62.4	89.6
FUSELAGE TOP BS 1240						
VERTICAL	4.9	175.4	5.9	306.4	13.9	134.6

TABLE 4
DATA SUMMARY, CONT'D

CHANNEL	001		002		003	
	MAXIMUM	TIME	MAXIMUM	TIME	MAXIMUM	TIME
PEAK ACCELERATIONS (g) AND VELOCITIES (ft/sec)						
FUSELAGE STARBOARD						
BS 1240 LONGITUDINAL	6.7	119.4	11.2	95.4	18.5	94.5
FUSELAGE STARBOARD						
BS 1240 VERTICAL	1.3	217.1	2.5	284.4	4.7	236.5
OVERHEAD STORAGE BINS:						
BIN A LONGITUDINAL	6.9	136.8	11.0	107.9	20.5	88.4
BIN A LATERAL	1.8	164.1	2.7	341.2	6.0	108.6
BIN A VERTICAL	2.4	189.2	3.6	398.0	21.7	107.9
BIN B LONGITUDINAL	23.2	176.8	12.9	83.1	23.3	108.6
BIN B LATERAL	17.5	207.5	4.4	61.2	32.6	120.1
BIN B VERTICAL	25.0	193.8	10.4	81.6	55.0	115.0
OVERHEAD STORAGE BIN						
<u>LINK LOADS (lbs)</u>						
BIN A:						
LINK NO. 3	-47.4	208.9	-55.4	137.8	-72.6	127.1
LINK NO. 4	-117.7	140.1	-212.6	115.1	-336.2	83.5
LINK NO. 5	-229.6	115.0	-327.1	106.9	-519.7	114.4
LINK NO. 6	95.2	76.2	109.2	74.0	137.5	44.5
LINK NO. 7	72.3	143.4	91.7	109.4	104.8	105.2
LINK NO. 8	-28.8	207.5	-65.1	120.1	-178.8	99.2
LINK NO. 9	-167.7	133.9	-285.9	117.1	-387.6	95.1
LINK NO. 10	-230.9	138.5	-379.5	118.0	-578.7	98.5
LINK NO. 11	-121.1	196.4	-79.5	188.4	-194.9	155.6
LINK NO. 13	73.8	121.9	106.9	112.5	201.0	95.4
LINK NO. 14	1539.5	136.4	2302.7	113.6	3510.9	96.5

NOTE: TENSION IS POSITIVE

TABLE 4
DATA SUMMARY, CONT'D

CHANNEL	001		002		003	
	MAXIMUM	TIME	MAXIMUM	TIME	MAXIMUM	TIME
BIN B:						
LINK NO. 1	251.8	204.1	---	---	---	---
LINK NO. 2	-47.4	167.5	---	---	---	---
LINK NO. 3	542.2	216.0	---	---	---	---
LINK NO. 4	-285.0	89.6	---	---	---	---
LINK NO. 5	-115.0	269.0	---	---	---	---
LINK NO. 6	169.3	192.0	---	---	---	---
LINK NO. 13	118.8	170.9	---	---	---	---
LINK NO. 14	-227.4	159.1	---	---	---	---
LINK NO. 15	286.8	187.0	---	---	---	---
LINK NO. 16	131.6	175.2	---	---	---	---
LINK NO. 21	89.1	195.6	---	---	---	---
LINK NO. 22	219.6	209.9	---	---	---	---
LINK NO. 23	257.9	234.0	---	---	---	---
LINK NO. 24	265.7	196.0	---	---	---	---
LINK NO. 32	1344.2	89.8	2471.3	79.2	---	---
LINK NO. 7	---	---	318.0	83.4	702.5	131.2
LINK NO. 8	---	---	-512.6	82.1	-642.3	103.6
LINK NO. 17	---	---	-502.6	82.2	-534.8	76.4
LINK NO. 18	---	---	-161.6	74.6	-218.9	101.1
LINK NO. 25	---	---	113.1	307.8	306.1	124.9
LINK NO. 28	---	---	190.5	74.5	186.3	127.9
LINK NO. 30	---	---	---	---	4131.3	66.4

NOTE: TENSION IS POSITIVE

SUMMARY OF RESULTS

A Boeing 707 airframe section was instrumented and longitudinally tested at input energy levels of 5.9 g (30.7 ft/sec), 8.8 g (37.5 ft/sec), and 13.2 g (42.3 ft/sec). A summary of the test results follows:

1. The fuselage shell and floor structure had no visible separation or structural damage.
2. Bin 'A' experienced some bending of the forward support bar at the low impact condition (Test 001). A new aft support bar and shear pin were fitted for the remaining tests and no further deformation was noted.
3. The Bin 'B' drag link fitting on the 60-inch bin pulled out of the top of the bin at the low impact condition (Test 001), resulting in various lateral and vertical attachment links breaking. The bin was repaired by bonding two steel plates to the exterior and interior of the damaged area, and attaching the drag link fitting by bolting through the exterior plate, bin top, and interior plate. No further problems occurred with this attachment, although at maximum conditions (Test 003) the forward edge of the exterior plate separated from the bin top.
4. The Bin 'B' forward panel on the 60-inch bin separated from the top panel and halfway down the outboard side panel at the maximum acceleration condition (Test 003).
5. At the maximum test condition (Test 003), peak longitudinal accelerations measured at the fuselage floor were in the 15.0 g to 15.3 g range.
6. At the maximum test condition (Test 003), peak longitudinal accelerations measured on the overhead storage bins were 20.5 g for Bin 'A' and 23.3 g for Bin 'B'.

REFERENCES

1. Crash Dynamics and Engineering Development Program, Federal Register, Volume 49, No. 185, September 21, 1984.
2. Johnson, D., and Garodz, L., Crashworthiness Experiment Summary - Full-Scale Transport Controlled Impact Demonstration Program, FAA Report DOT/FAA/CT-85/20, June 1986.
3. Johnson, D., and Wilson, T., Vertical Drop Test of a Transport Airframe Section, FAA Report DOT/FAA/CT-TN86/34, October 1986.
4. Wittlin, G., Analytical Modeling of Transport Aircraft Crash Scenarios to Obtain Floor Pulses, FAA Report DOT/FAA/CT-82/83, April 1983.
5. Wade, B., and Johnson, D., Longitudinal Impact Test of a Transport Airframe Section, FAA Report DOT/FAA/CT-87/26, August 1988.

OVERALL AND INSTRUMENTATION VIEWS

(FIGURES 1 THROUGH 7)

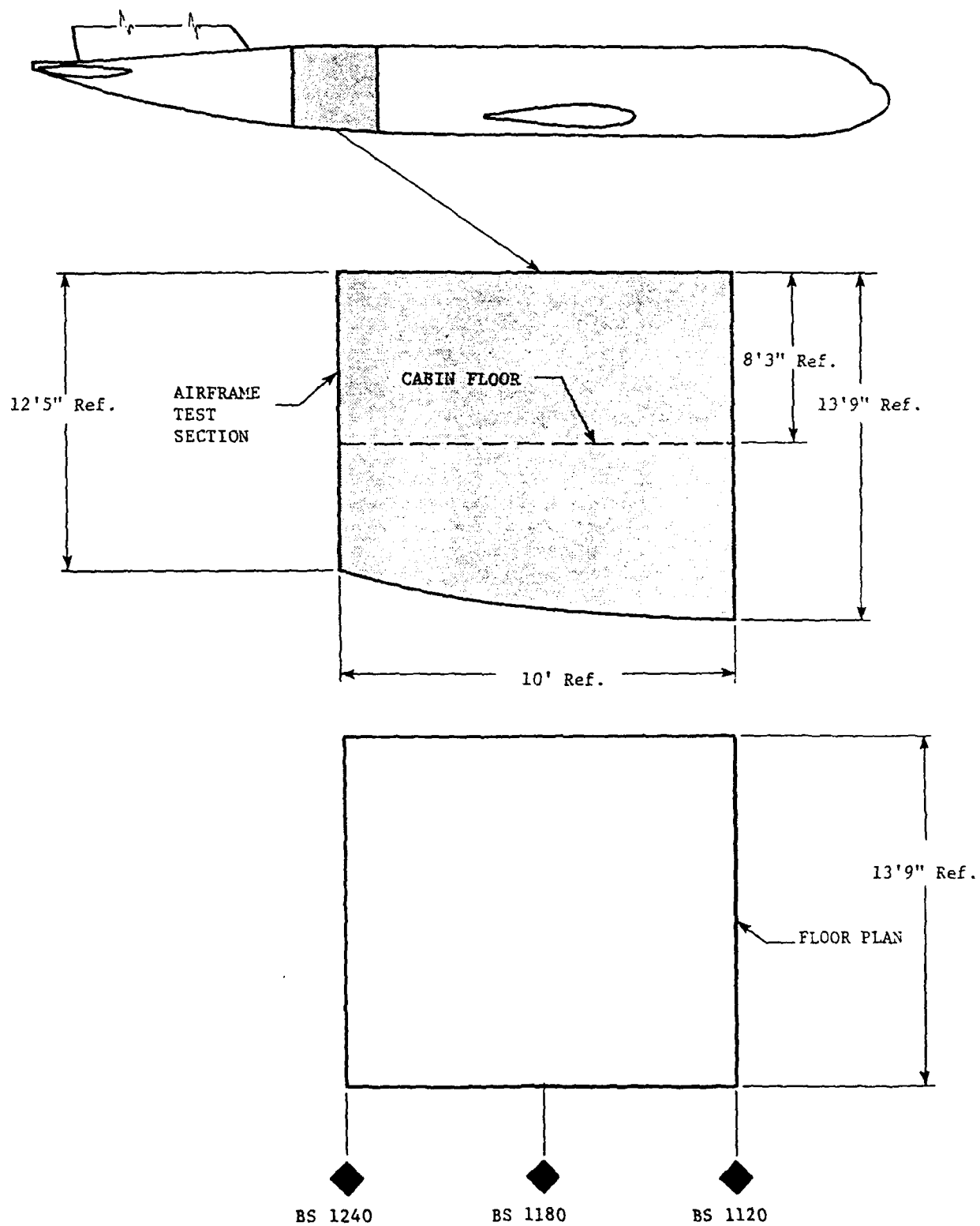
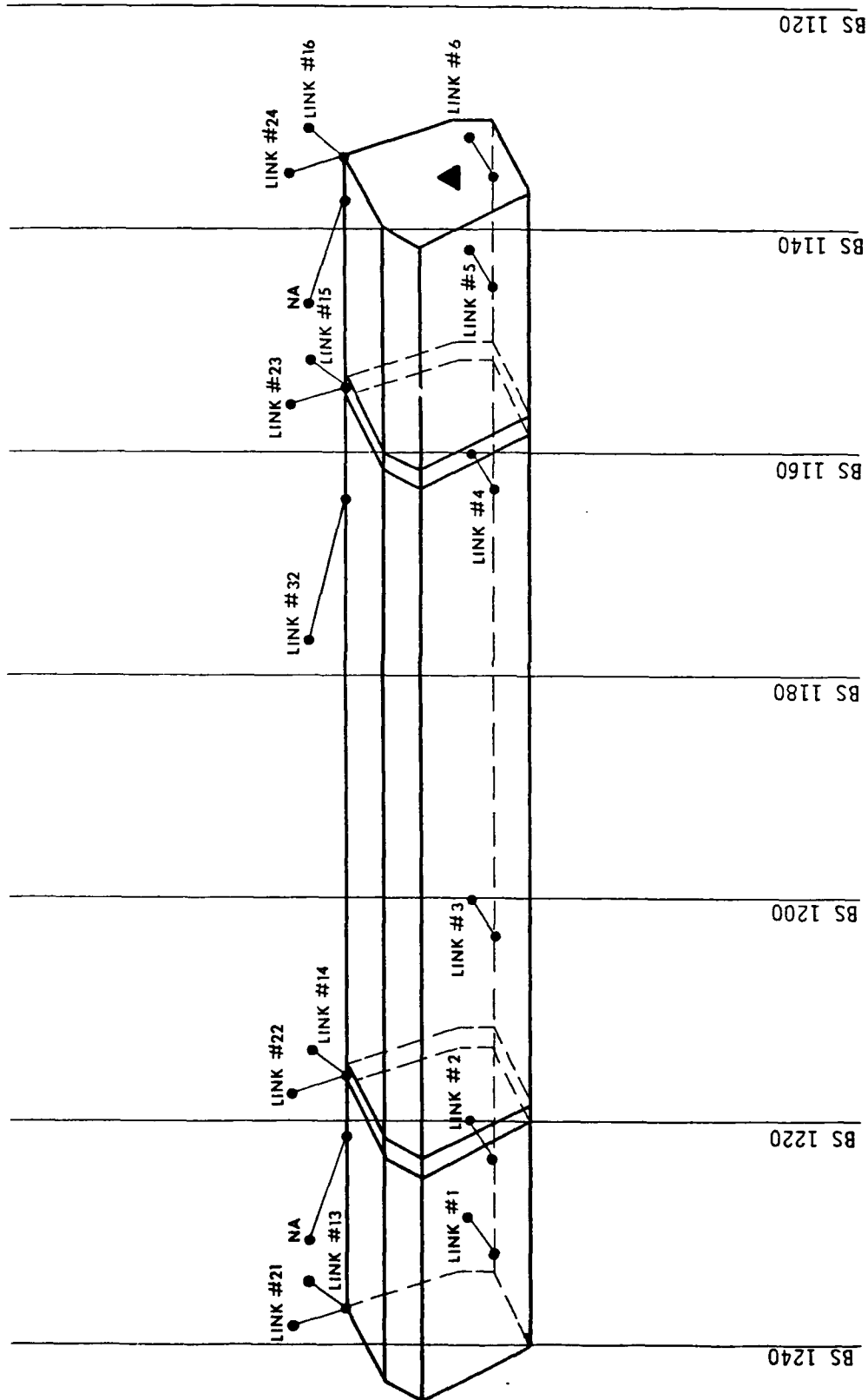
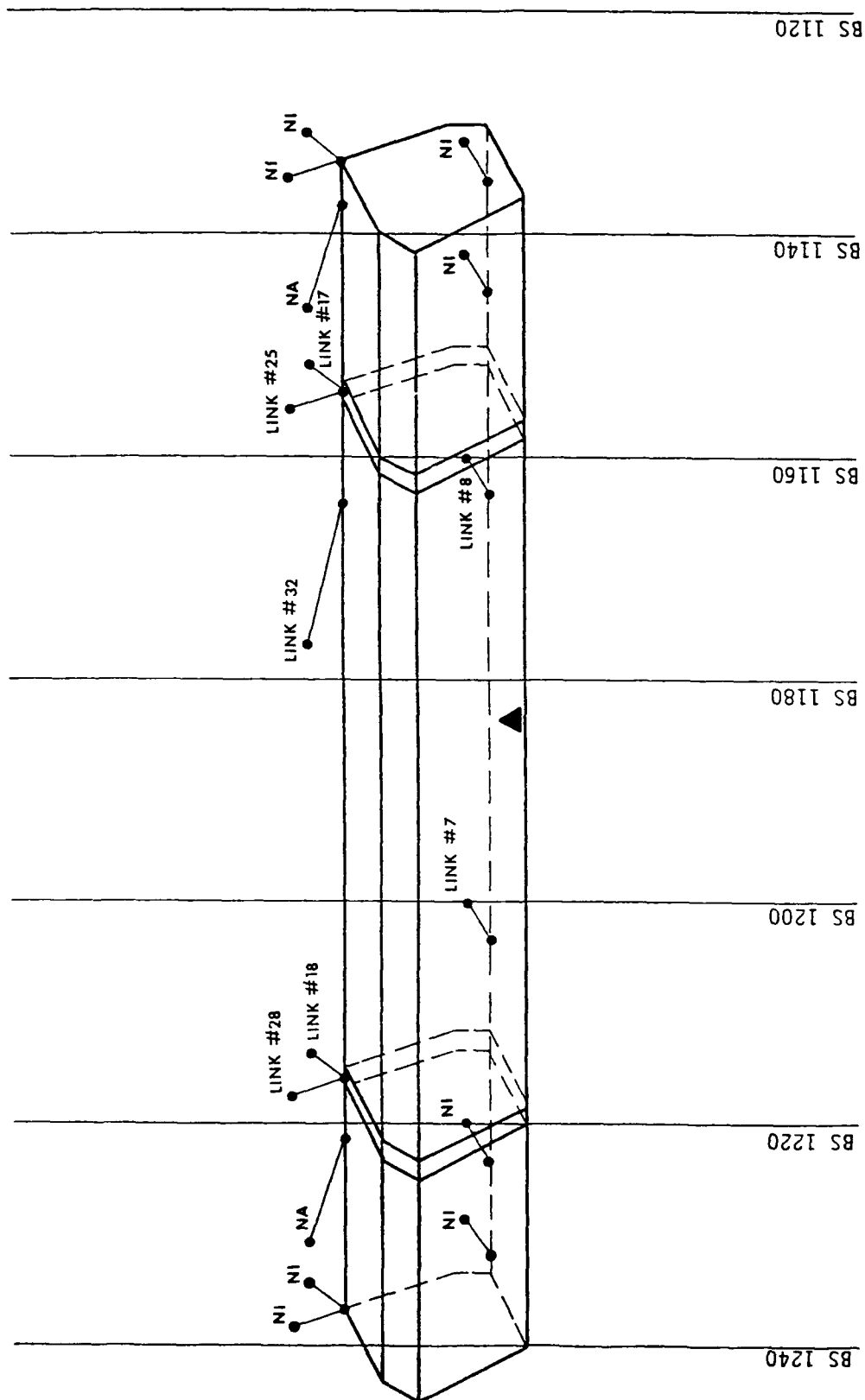


Figure 1 - AIRFRAME TEST SECTION/FLOOR PLAN



▲ ACCELEROMETER (TRIAx)
 NA - LINK NOT ATTACHED TO BIN

Figure 2 - BIN B INSTRUMENTATION LOCATIONS
 TEST 001



▲ ACCELEROMETER (TRIAX)
 NA - LINK NOT ATTACHED TO BIN
 NI - NON INSTRUMENTED LINK

Figure 3 - BIN B INSTRUMENTATION LOCATIONS
 TEST 002

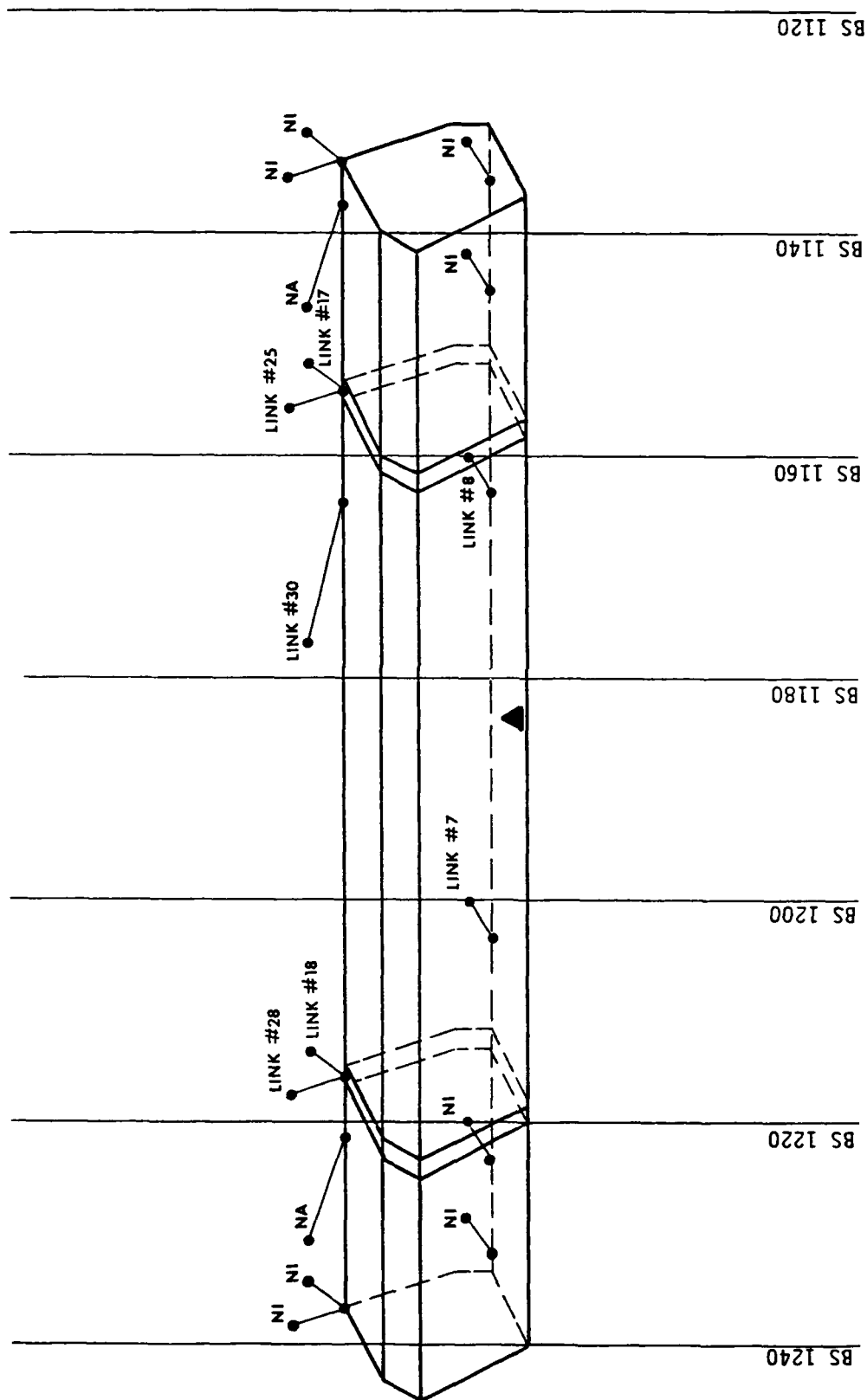


Figure 4 - BIN B INSTRUMENTATION LOCATIONS

TEST 003

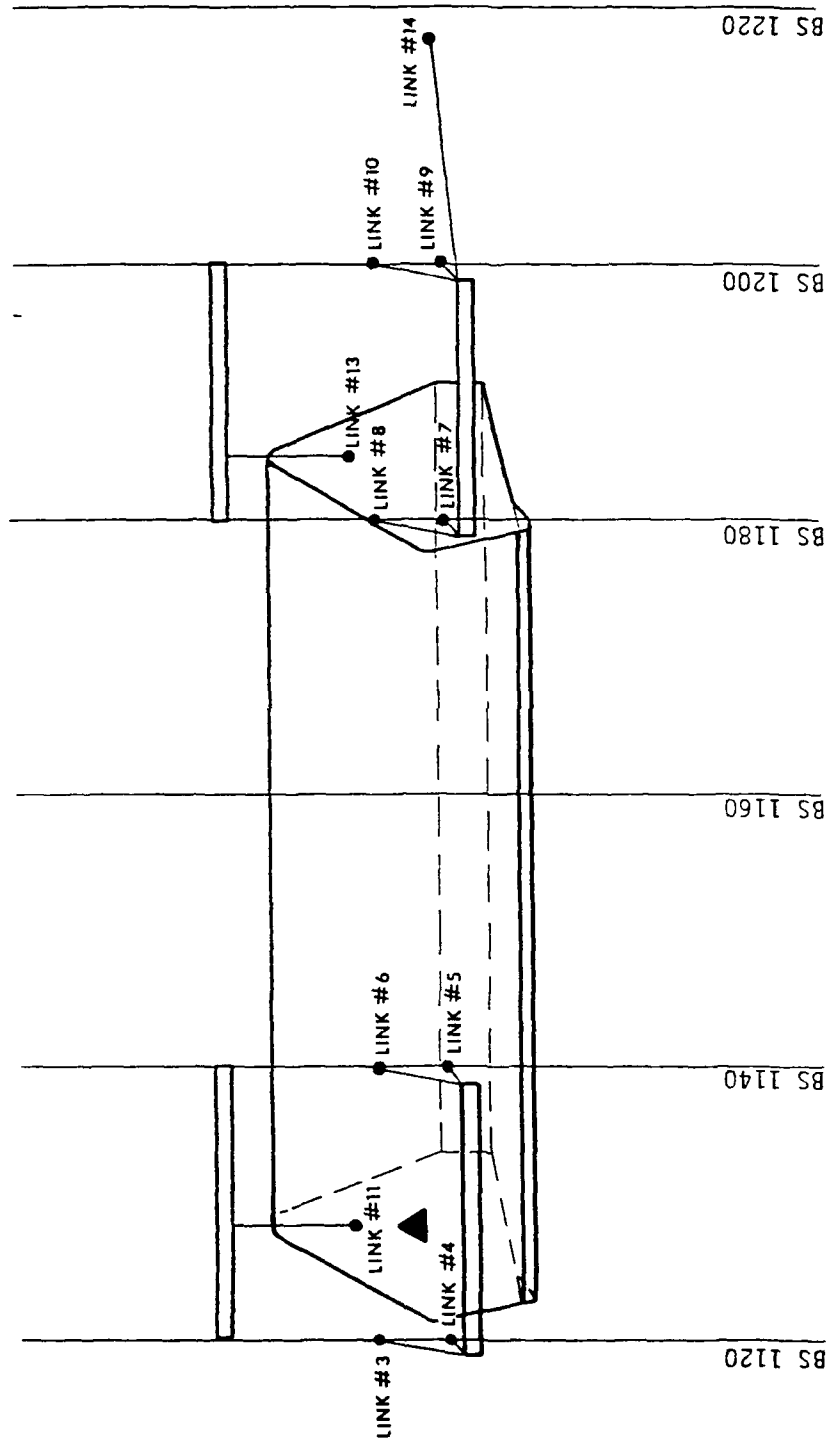


Figure 5 - BIN A INSTRUMENTATION LOCATIONS
TEST 001

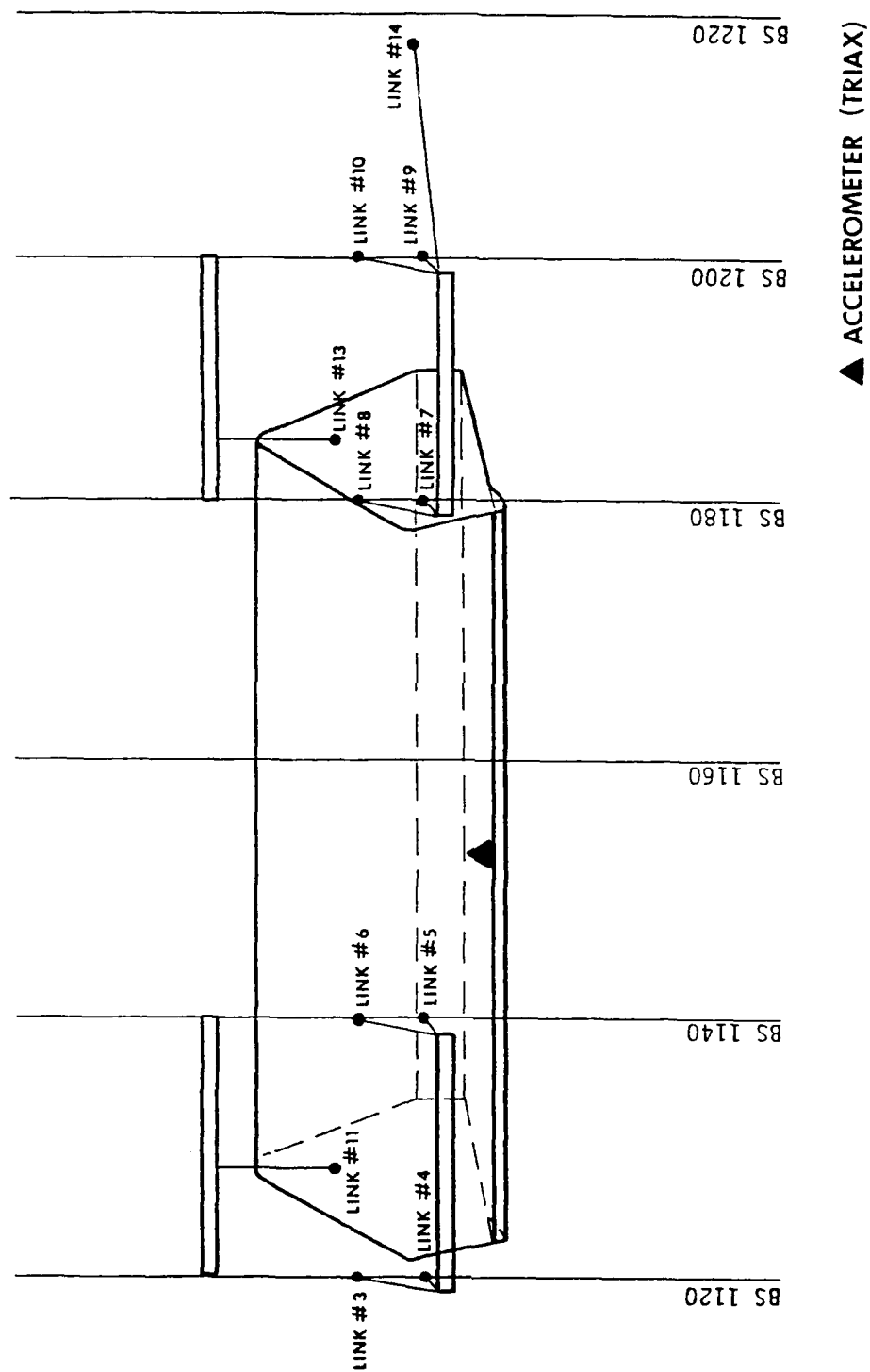


Figure 6 - BIN A INSTRUMENTATION LOCATIONS
TESTS 002 & 003

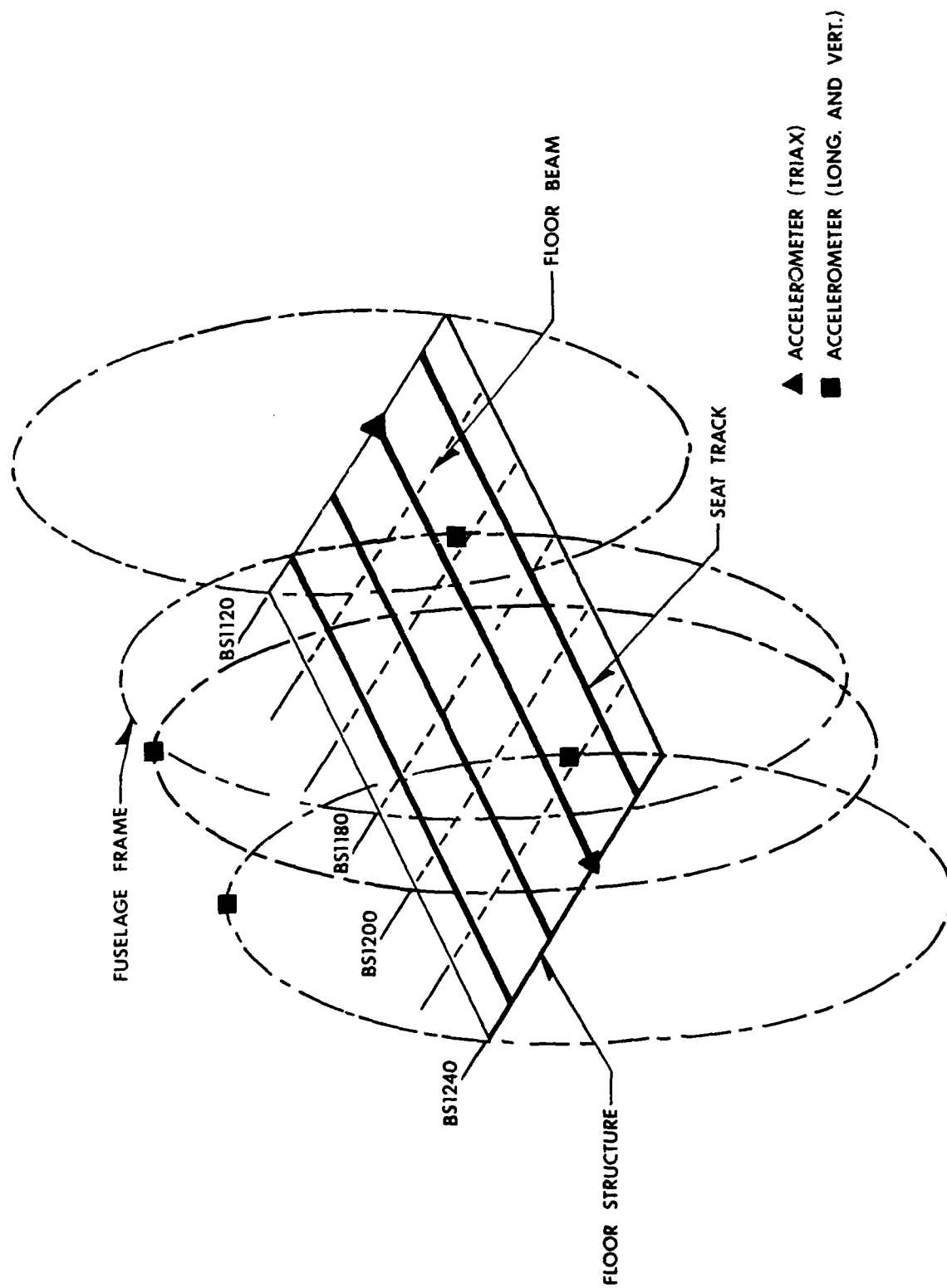


Figure 7 - AIRFRAME INSTRUMENTATION LOCATIONS

TEST 001

(FIGURES 8 THROUGH 76)

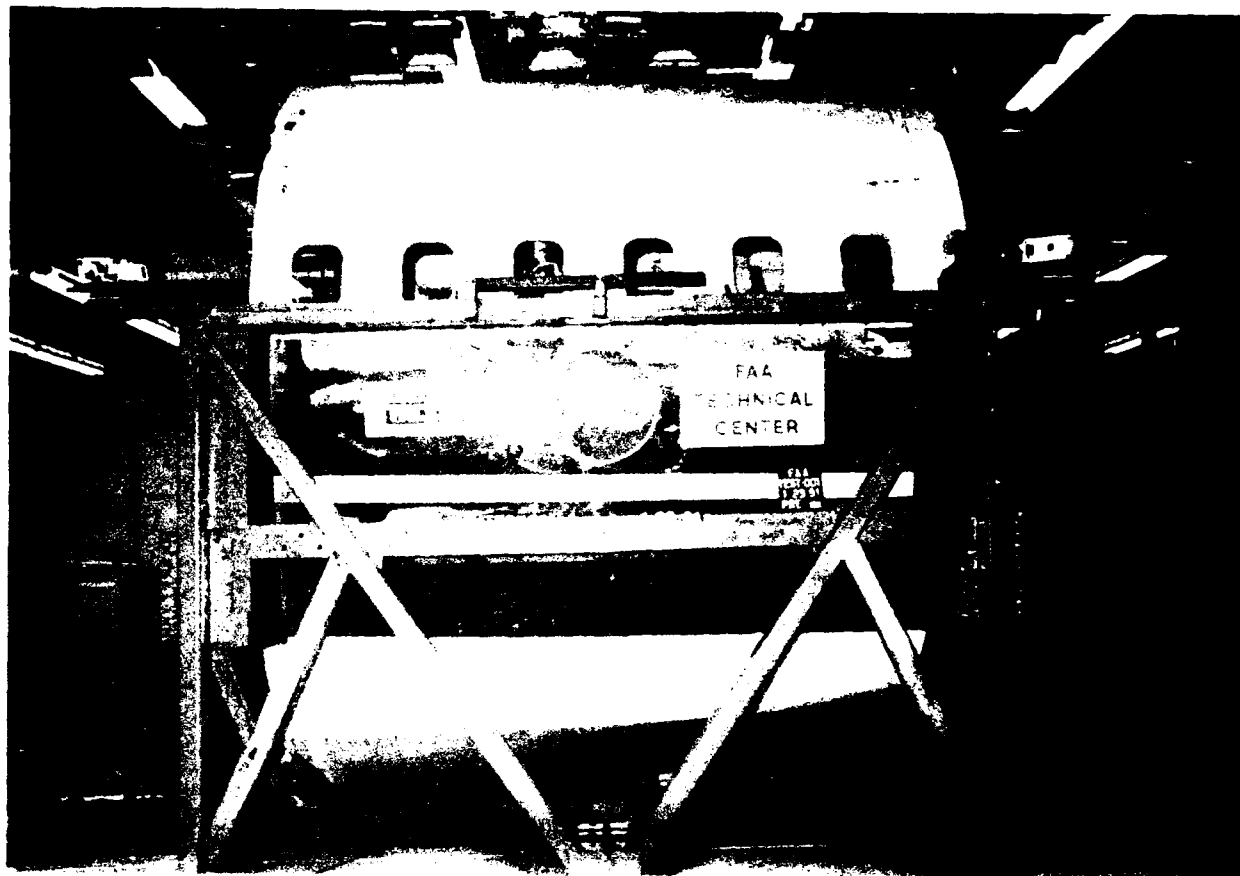


FIGURE 1. LEFT SIDE VIEW

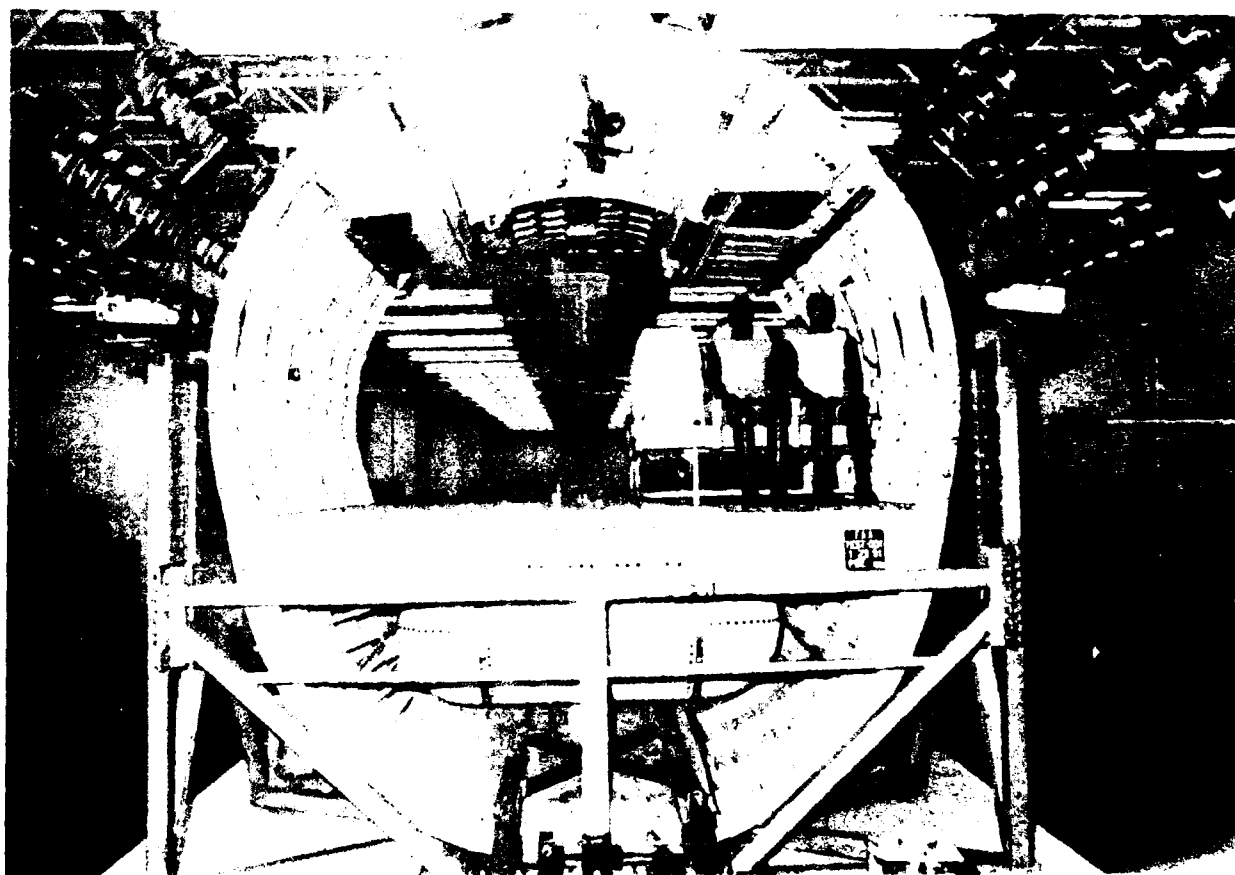


FIGURE 2. FRONT VIEW

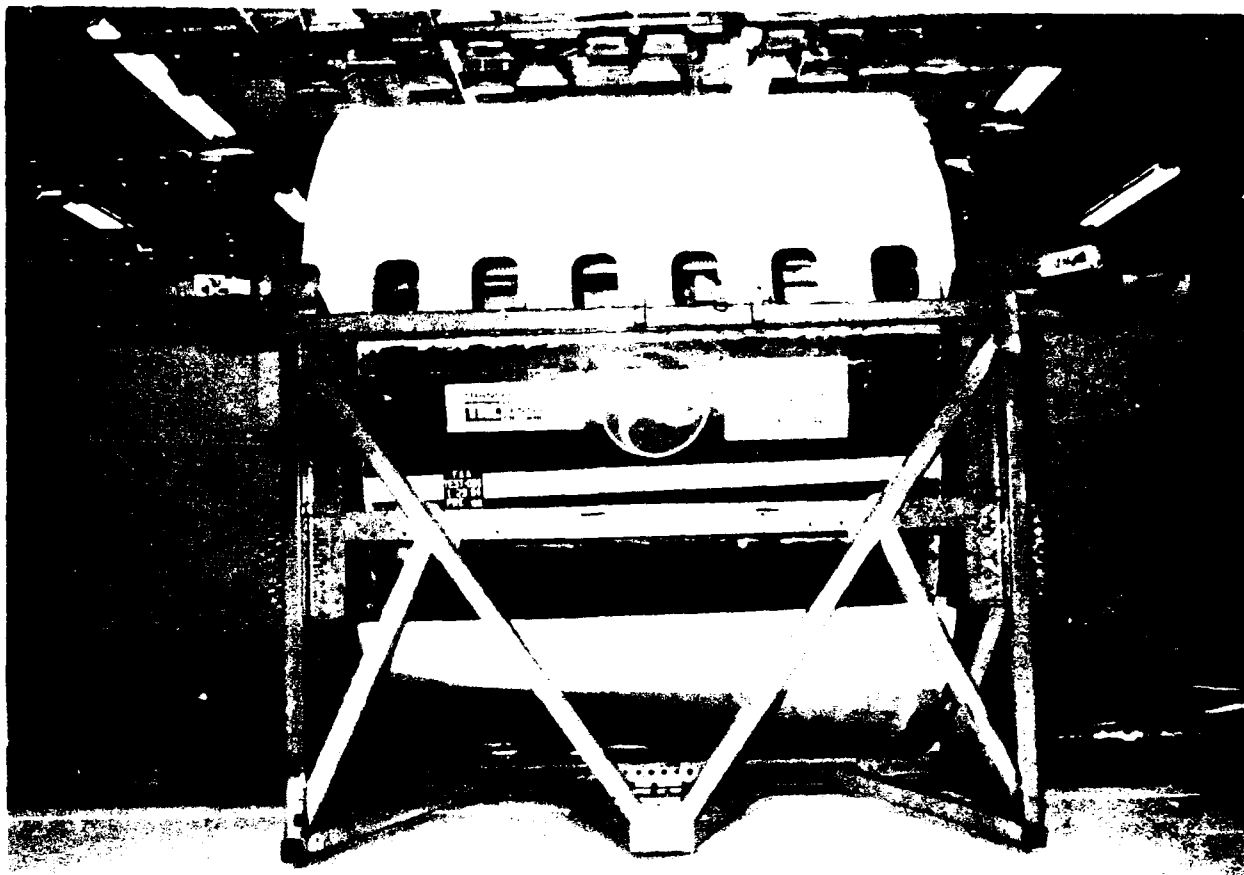


Figure 10. PRE TEST OVERALL RIGHT SIDE VIEW

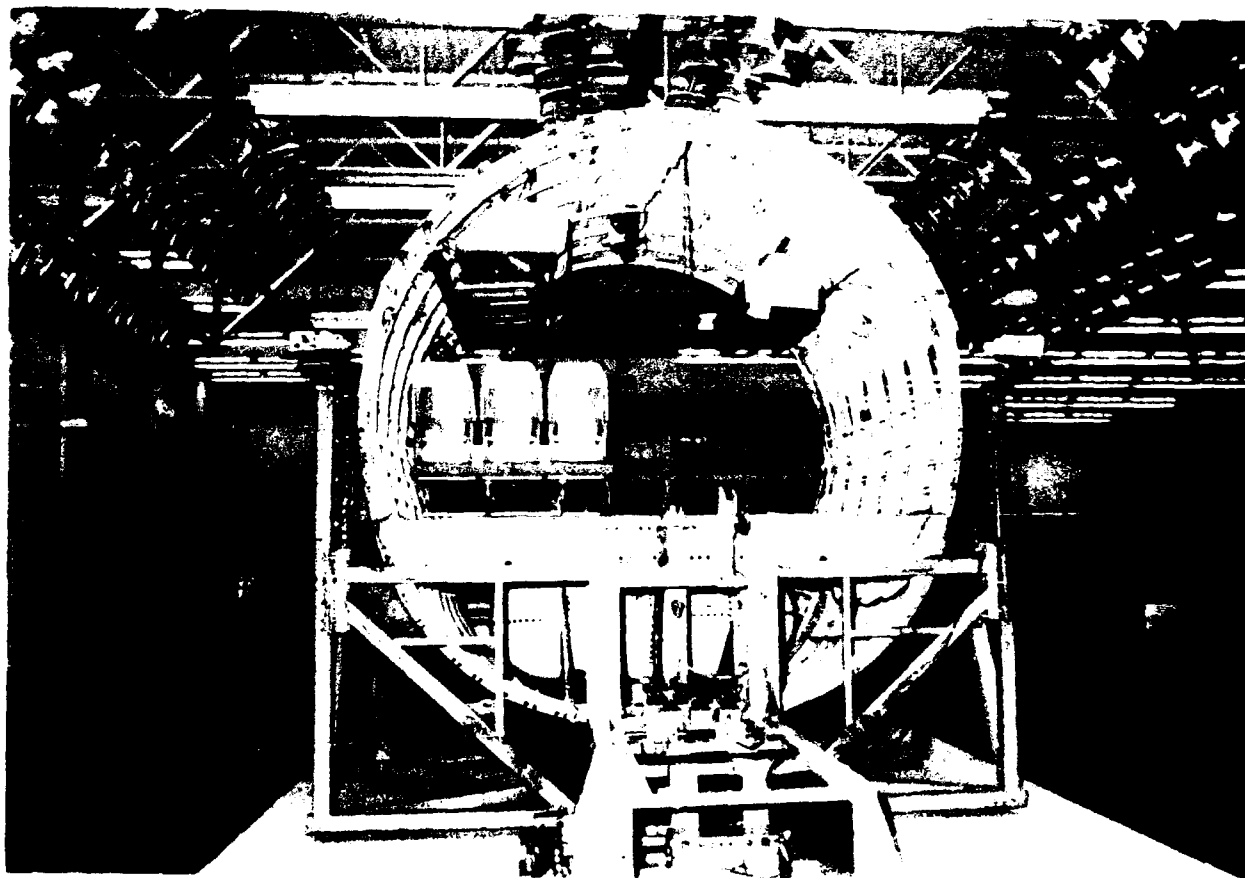


Figure 11. PRE TEST OVERALL FRONT VIEW

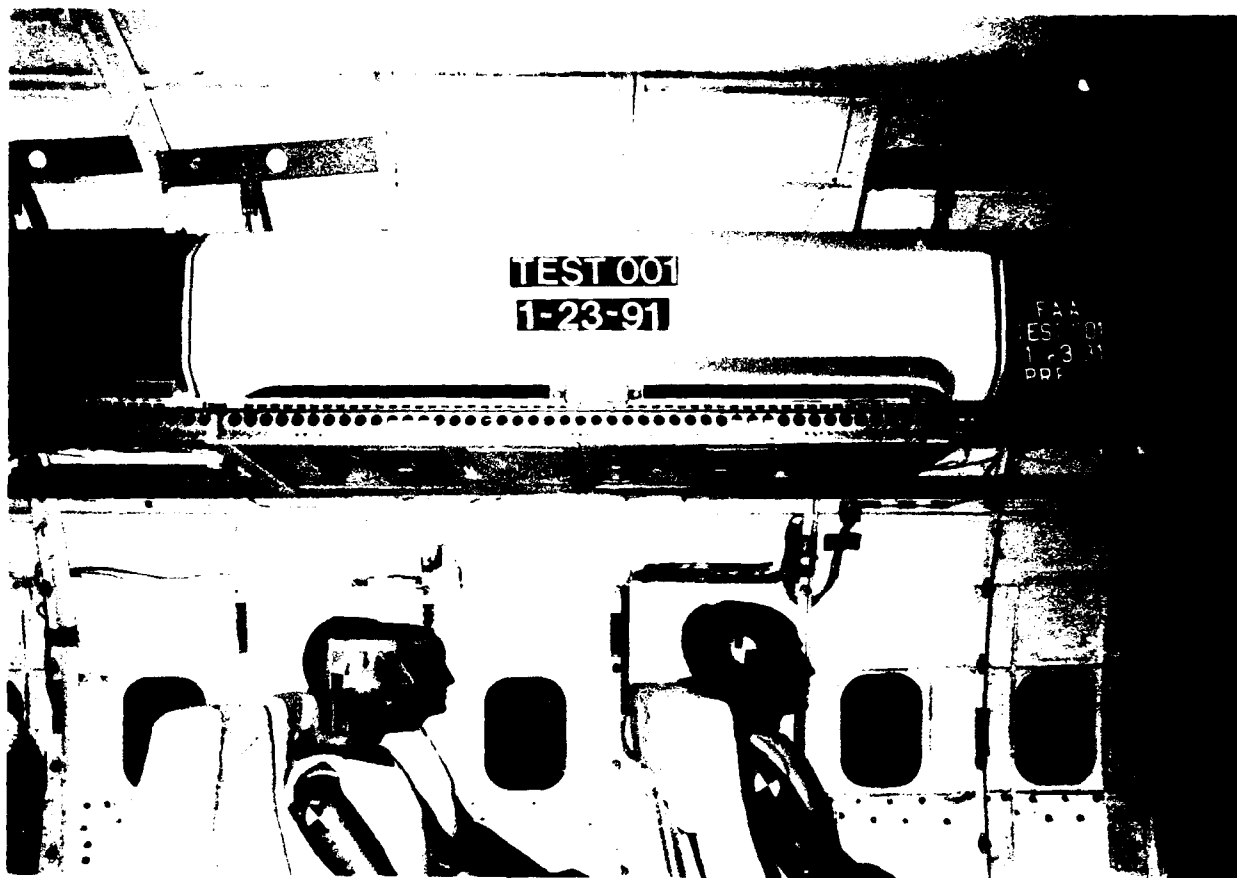


Figure 12. PRE-TEST BIN 'B' OVERALL SIDE VIEW

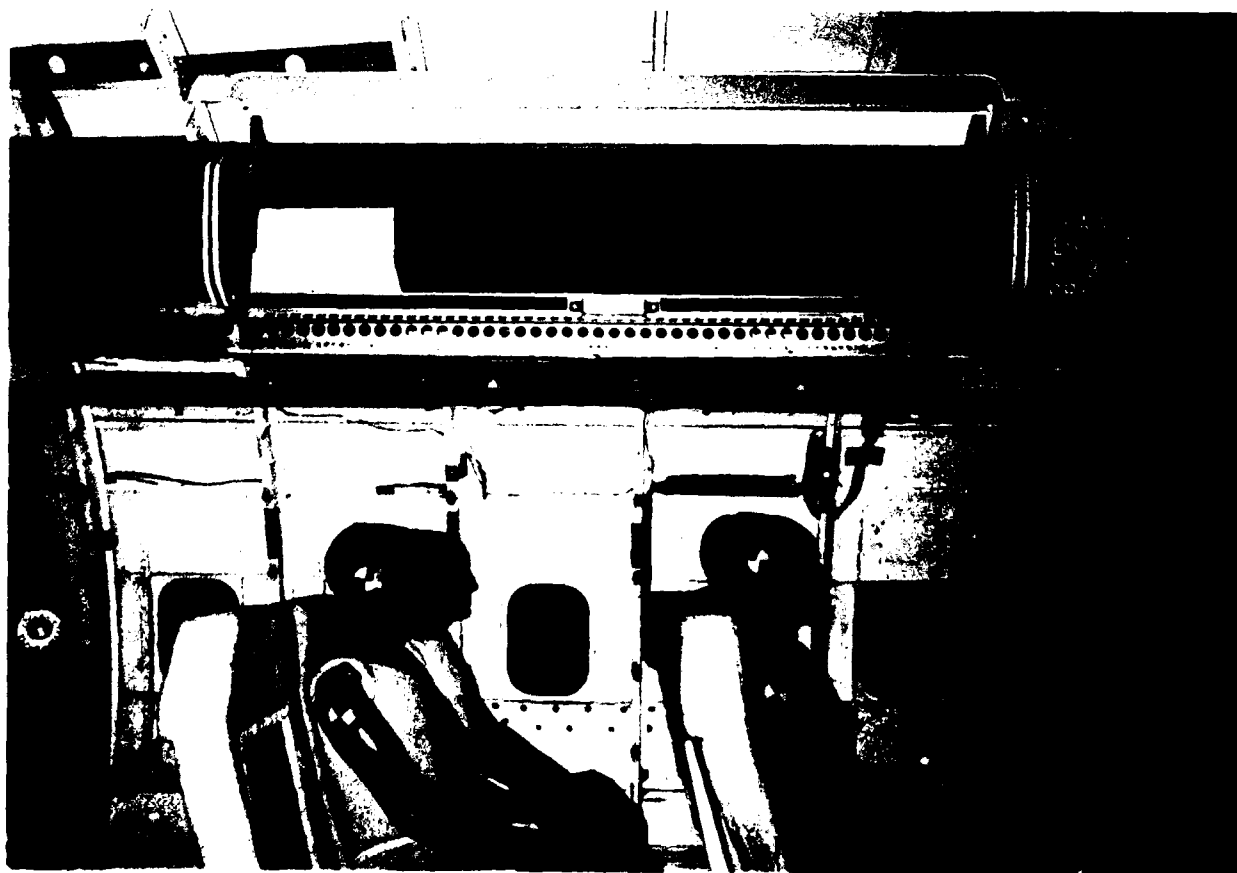


Figure 13. PRE-TEST BIN 'B' BALLAST POSITION



Figure 14. PRE-TEST BIN 'B' REAR ANGLE VIEW

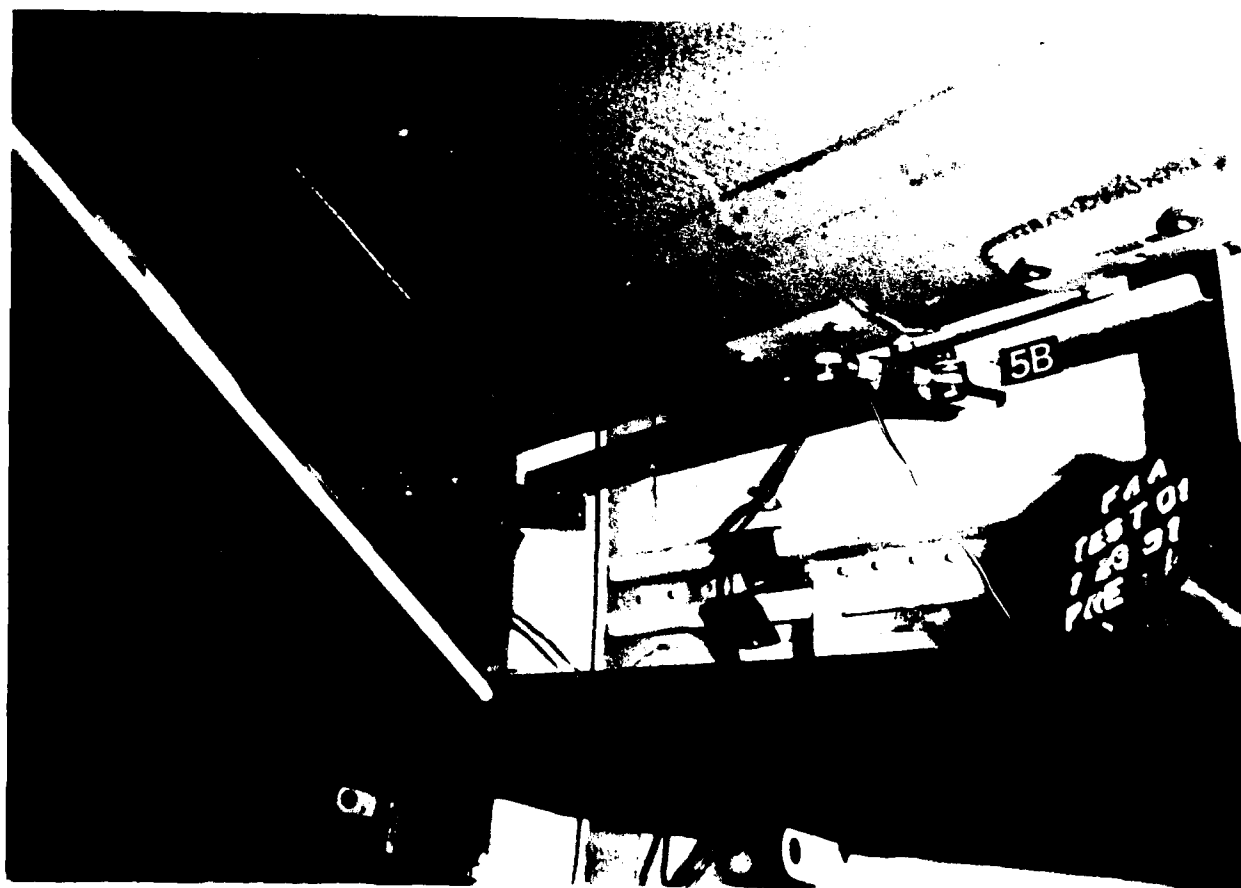


Figure 15. PRE TEST BIN 'B' LINKS 4 AND 5

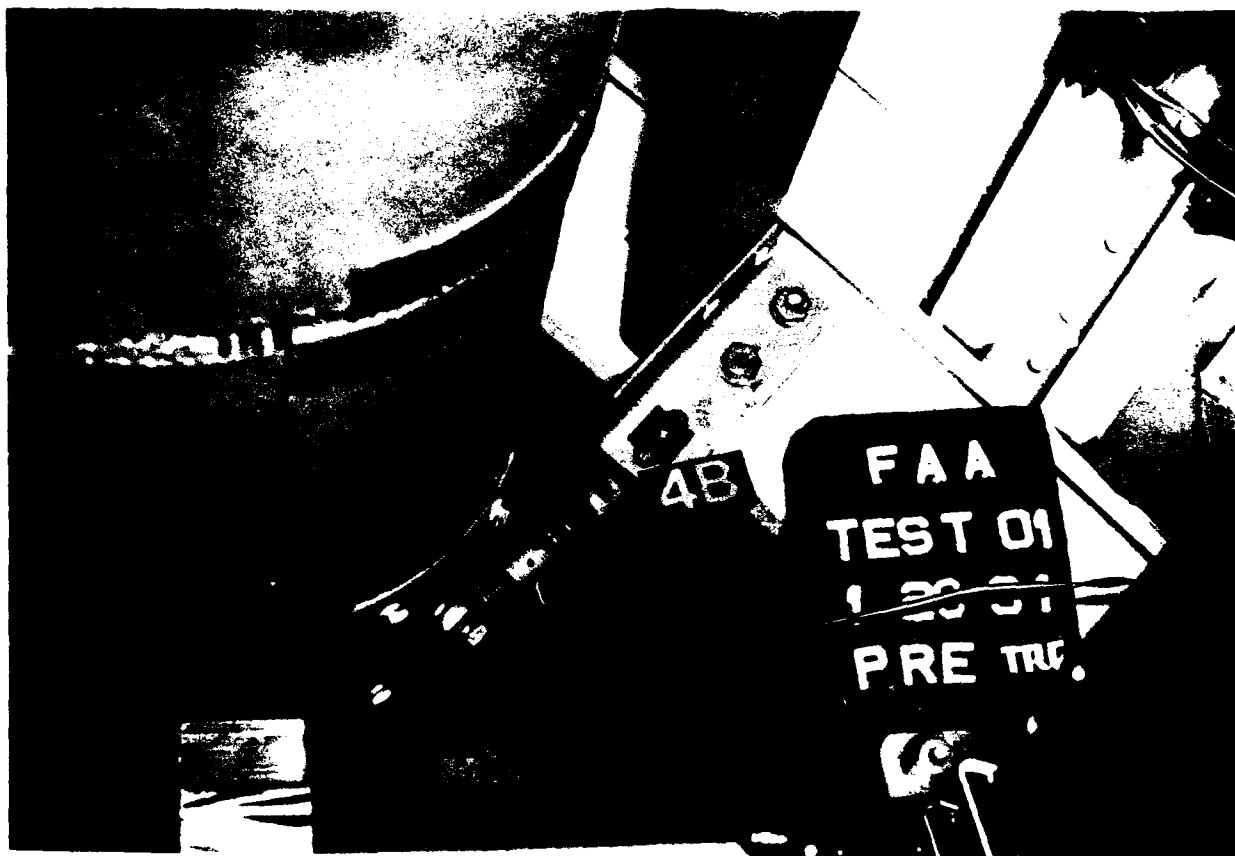


Figure 16. PRE-TEST BIN 'B' LINK 4 CLOSE-UP

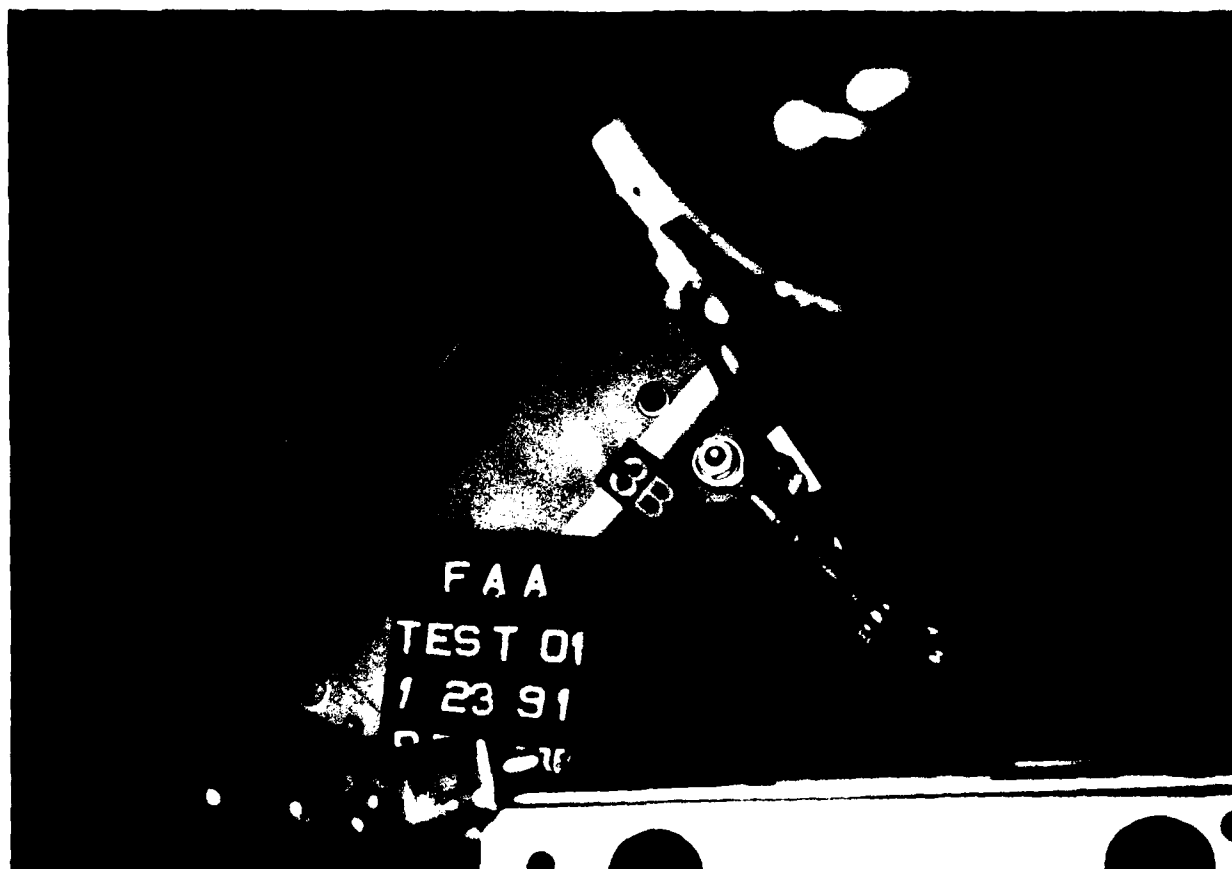


Figure 17. PRE-TEST BIN 'B' LINK 3 CLOSE-UP



Figure 18. PRE-TEST BIN 'B' LINK 2



Figure 19. PRE TEST BIN 'B' LINK 1 CLOSE-UP



Figure 20. PRE-TEST BIN 'B' LINKS 15, 16, 23, AND 24

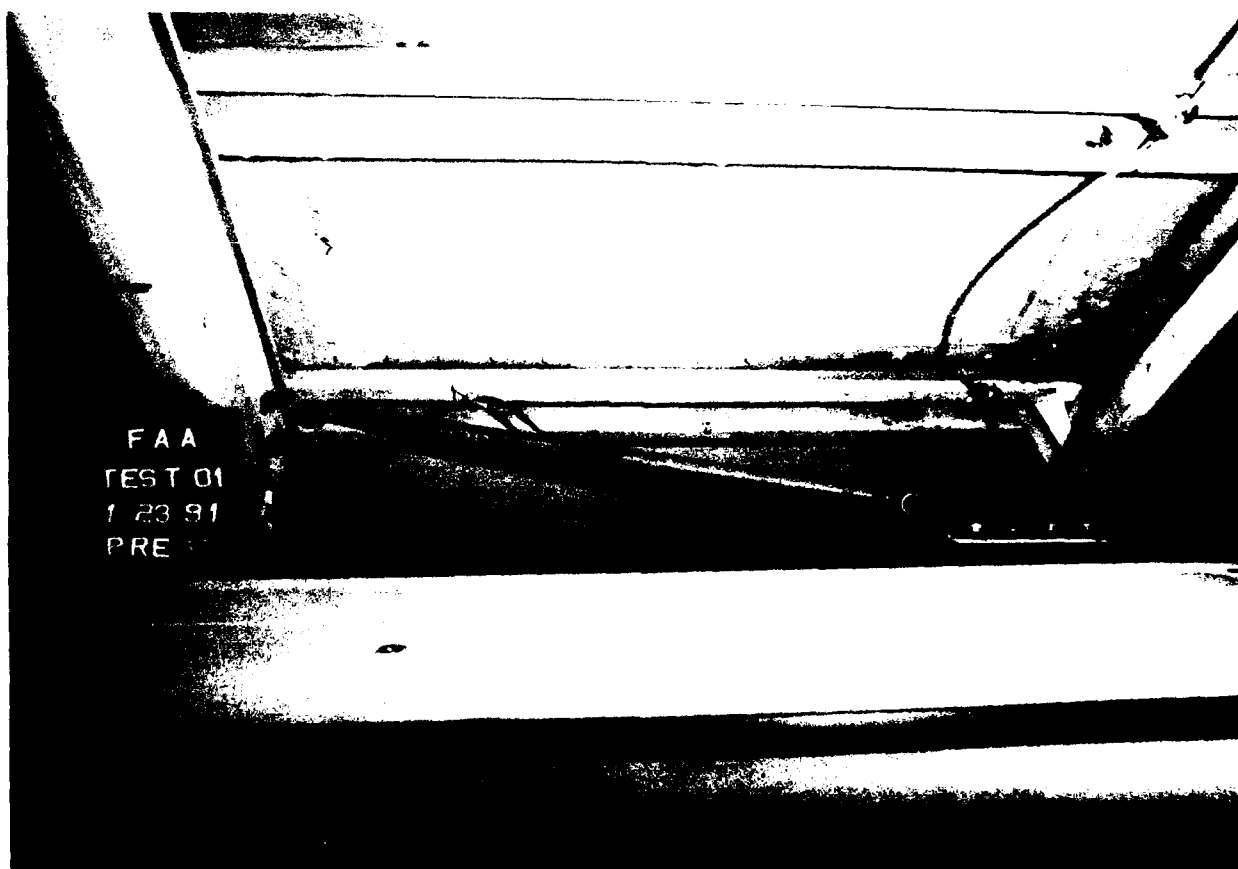


Figure 21. PRE TEST BIN 'B' LINK 32

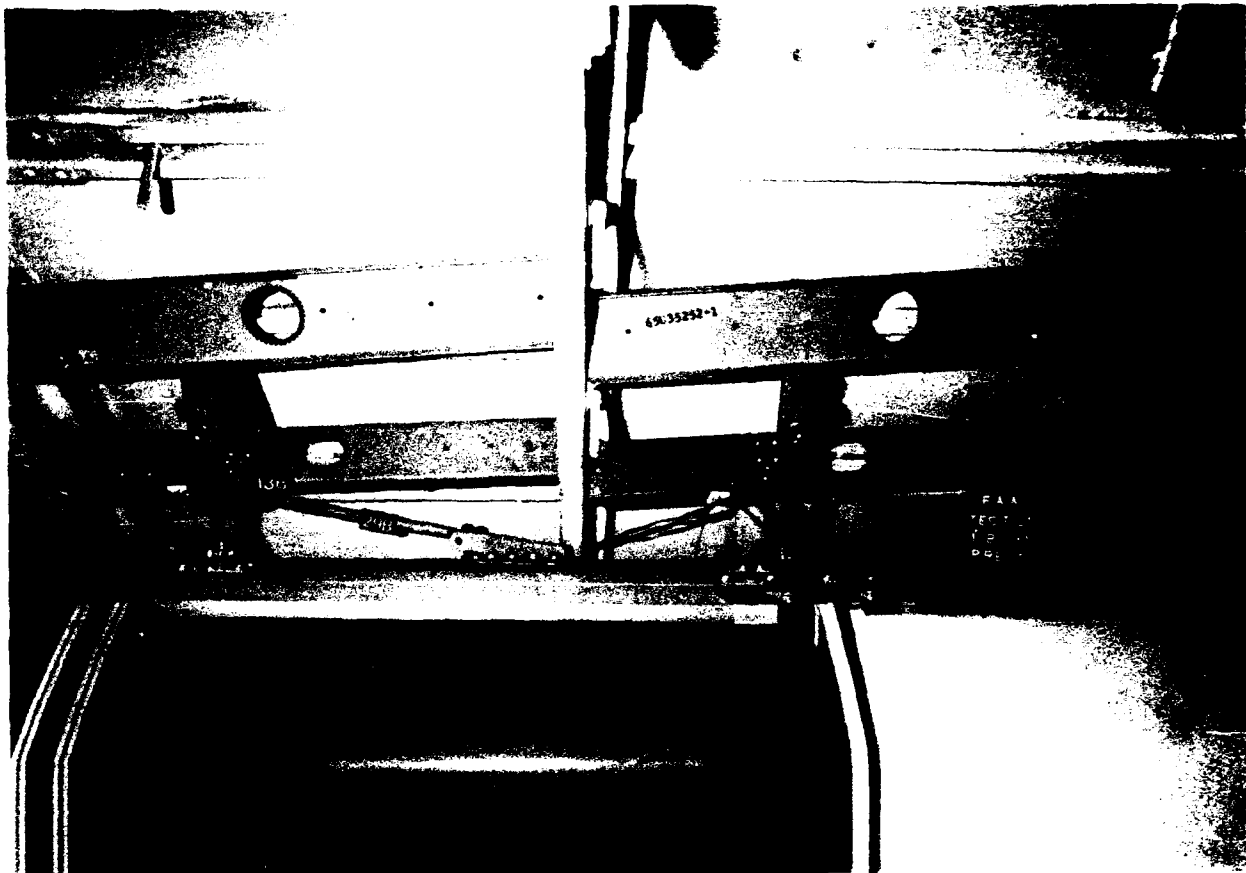


Figure 22. PRE-TEST BIN 'B' LINKS 13, 14, 21, AND 22



Figure 23. PRE TEST BIN 'A' OVERALL SIDE VIEW



Figure 24. PRE-TEST BIN 'A' SIDE VIEW CLOSE-UP



Figure 25. PRE TEST BIN 'A' BALLAST POSITION



Figure 26. PRE-TEST BIN 'A' FORWARD STRUCTURE FRONT ANGLE VIEW

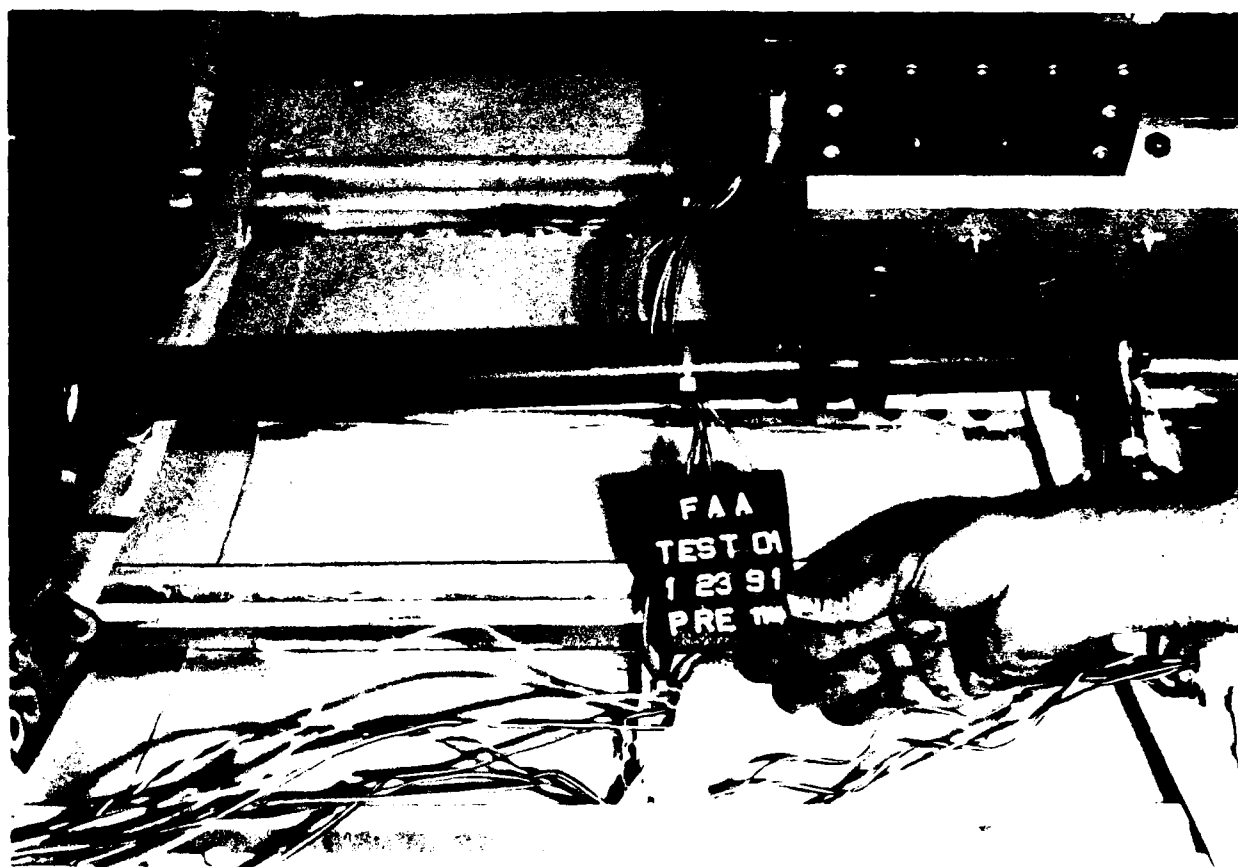


Figure 27. PRE-TEST BIN 'A' FRONT SUPPORT BAR

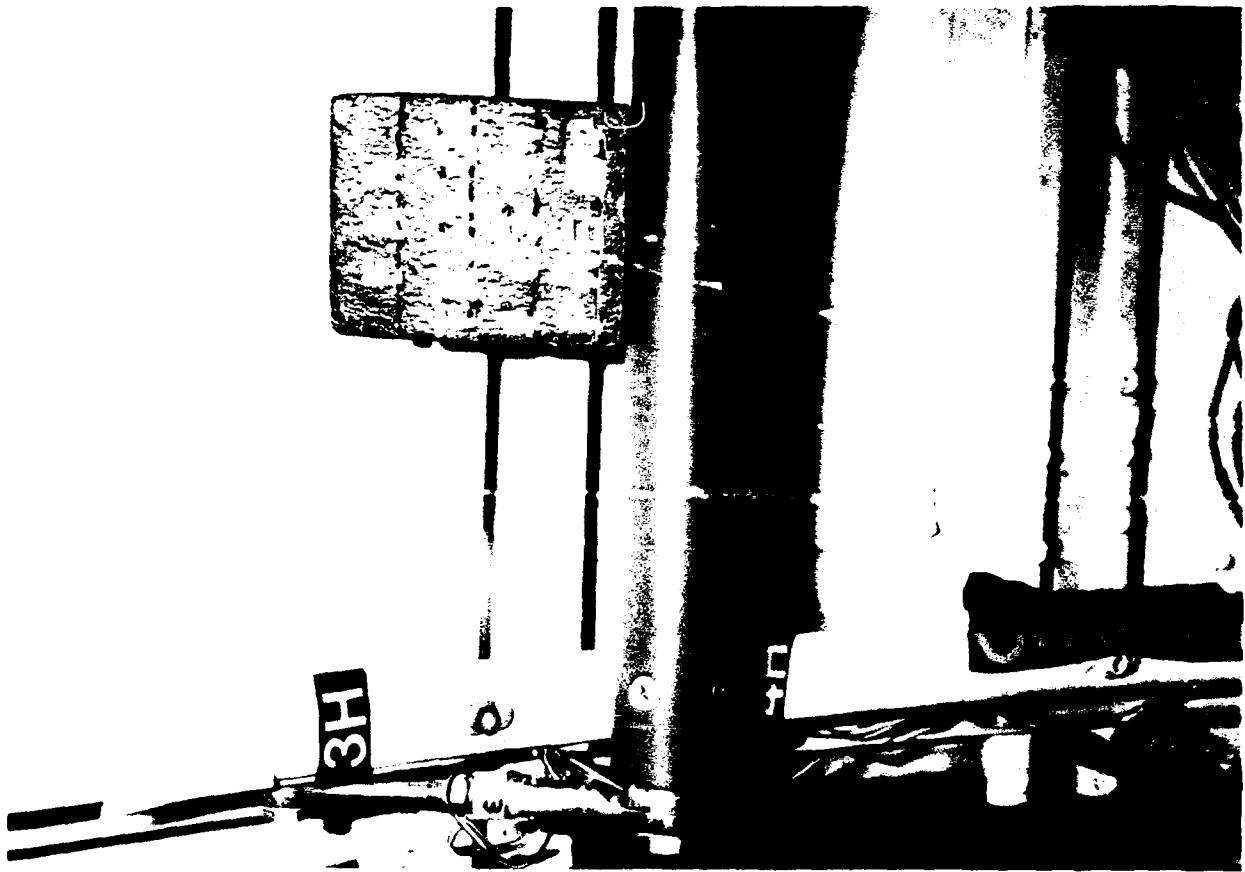


Figure 28. PRE TEST BIN 'A' LINES 3 AND 4

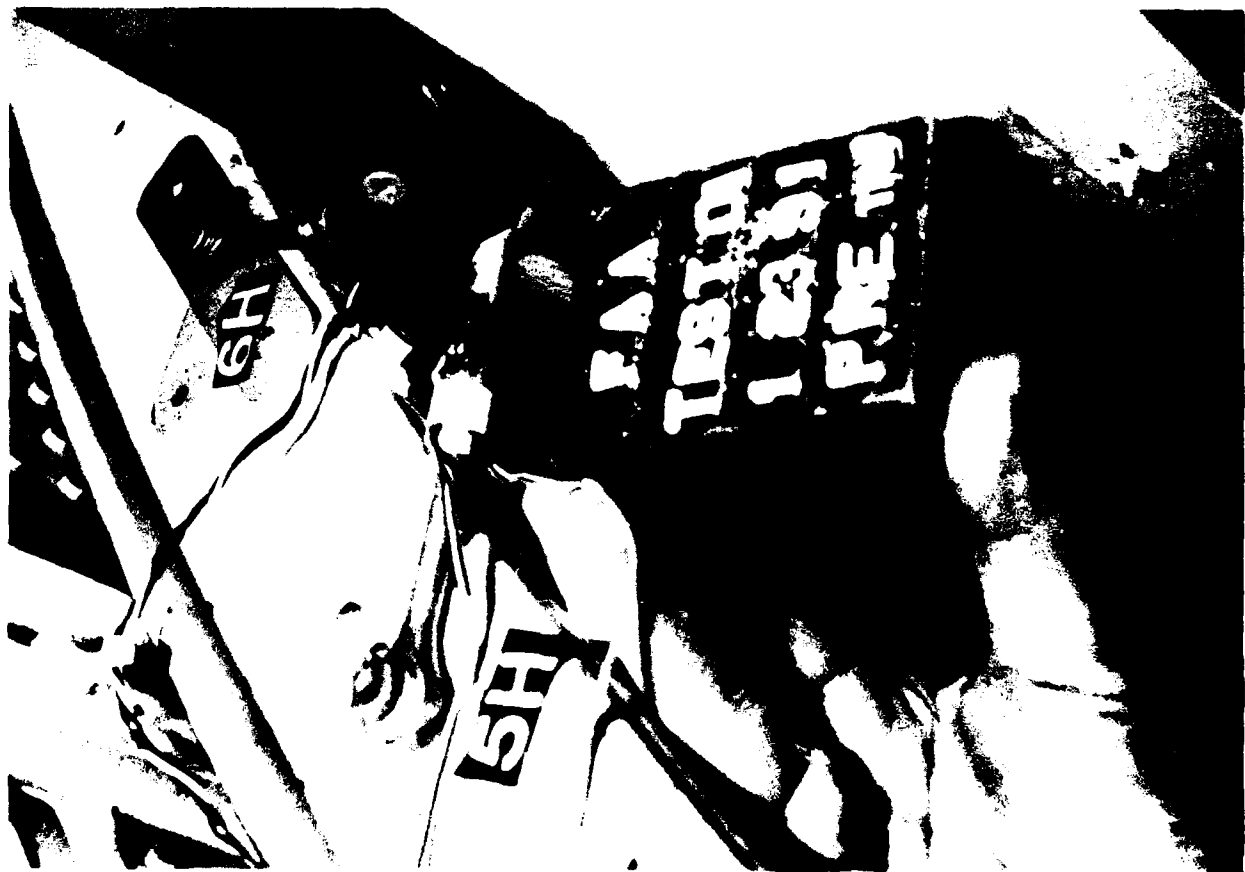


Figure 29. PRE TEST BIN 'A' LINES 5 AND 6



Figure 30. PRE TEST BIN 'A' REAR STRUCTURE REAR ANGLE VIEW



Figure 31. PRE TEST BIN 'A' REAR SUPPORT BAR

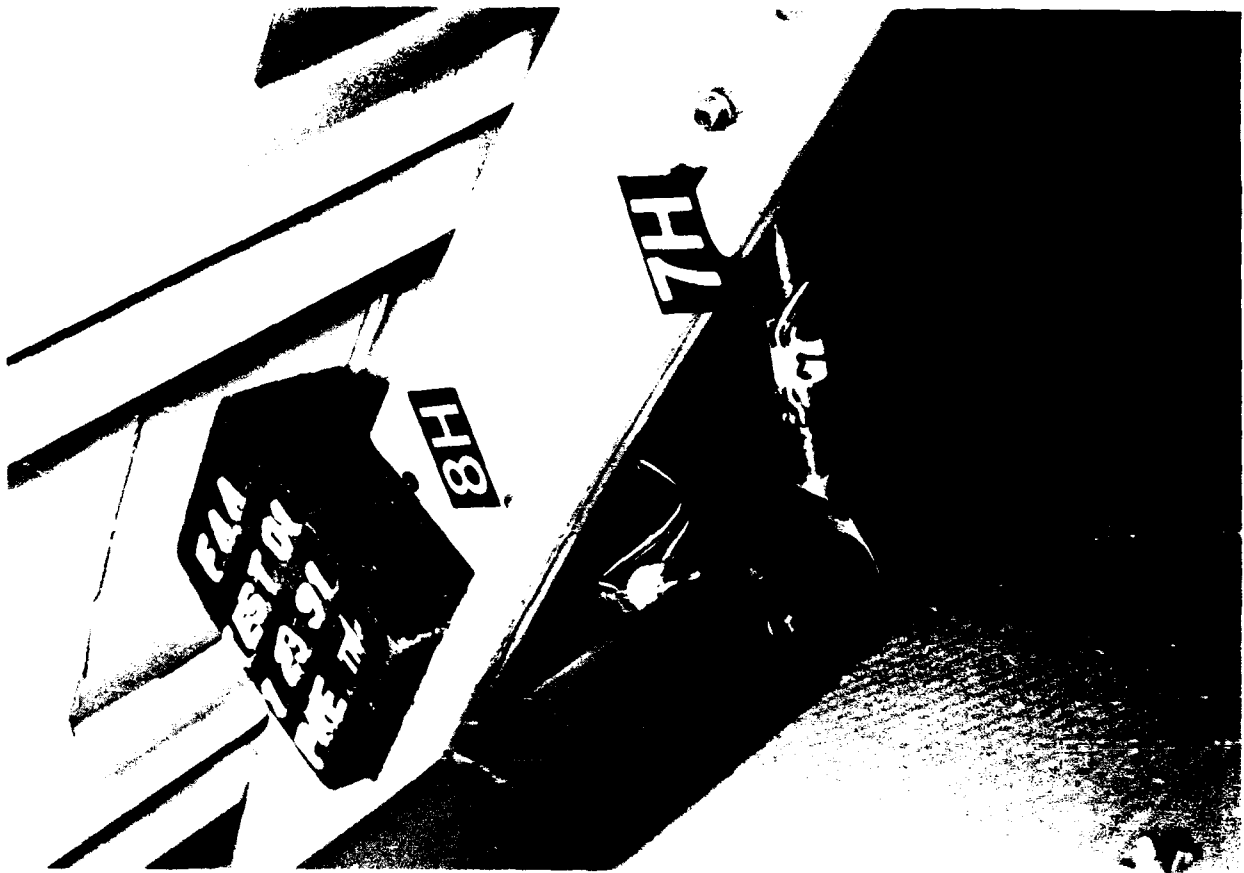


Figure 32. PRE-TEST BIN 'A' LINKS 7 AND 8



Figure 33. PRE-TEST BIN 'A' LINK 13

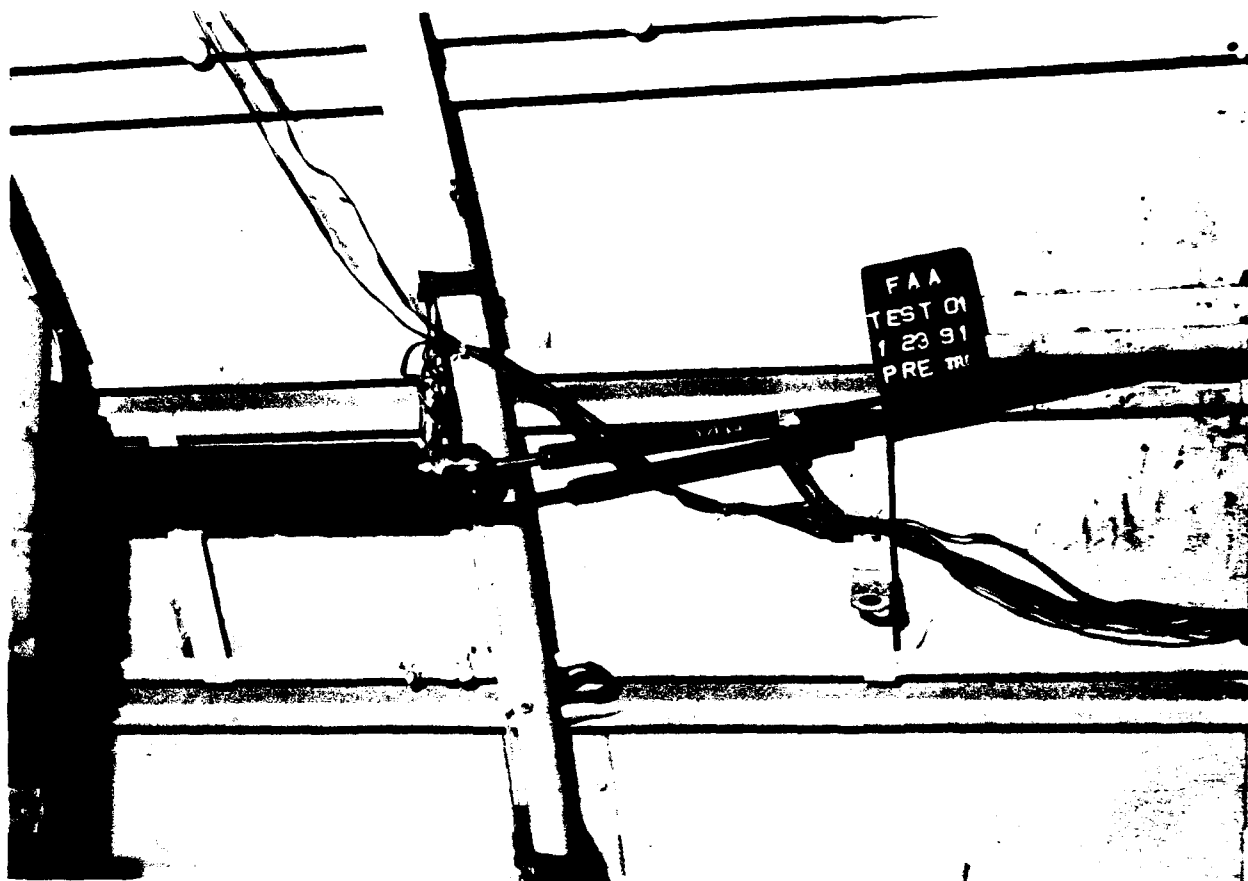


Figure 34. PRE-TEST BIN 'A' LINKS 9, 10, AND 14

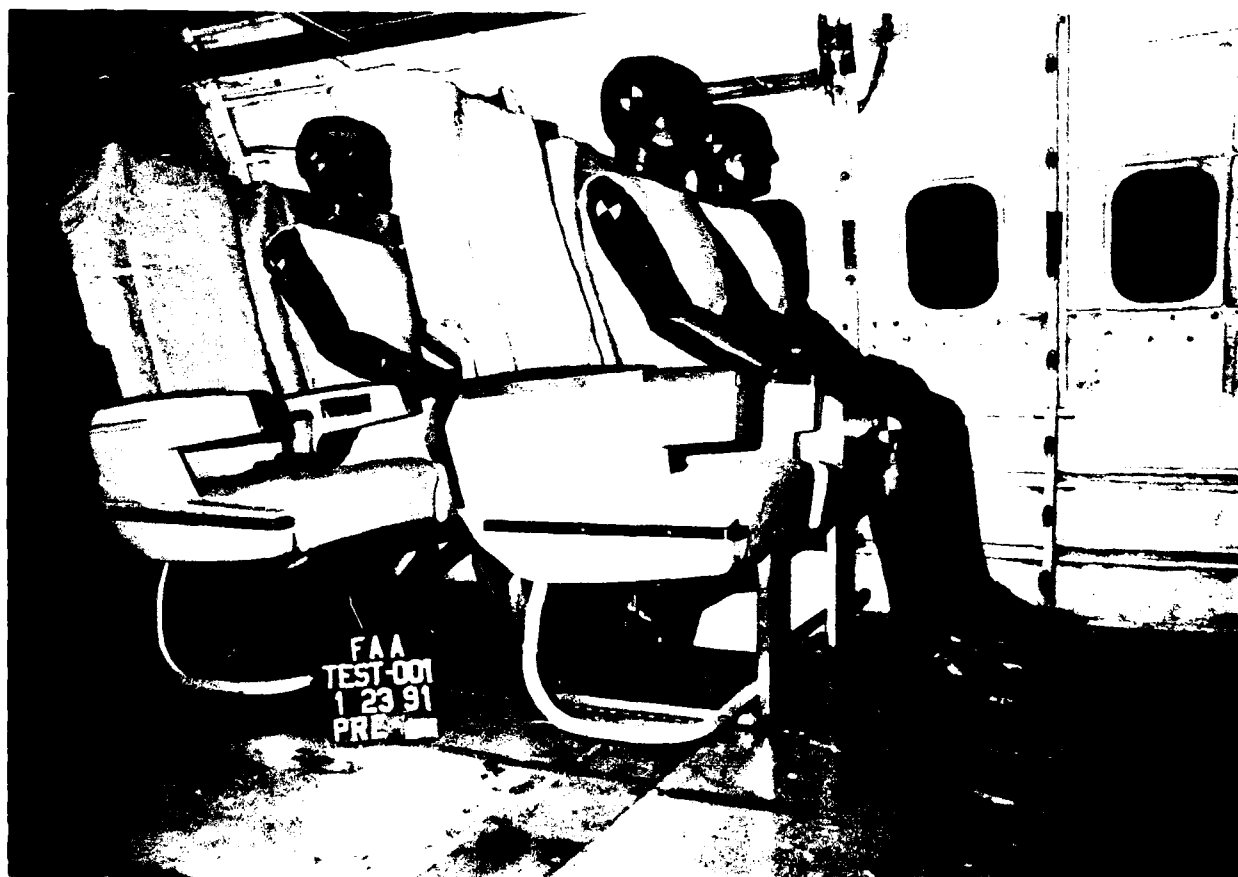


Figure 35. PRE-TEST SEATS AND DUMMIES FRONT ANGLE VIEW

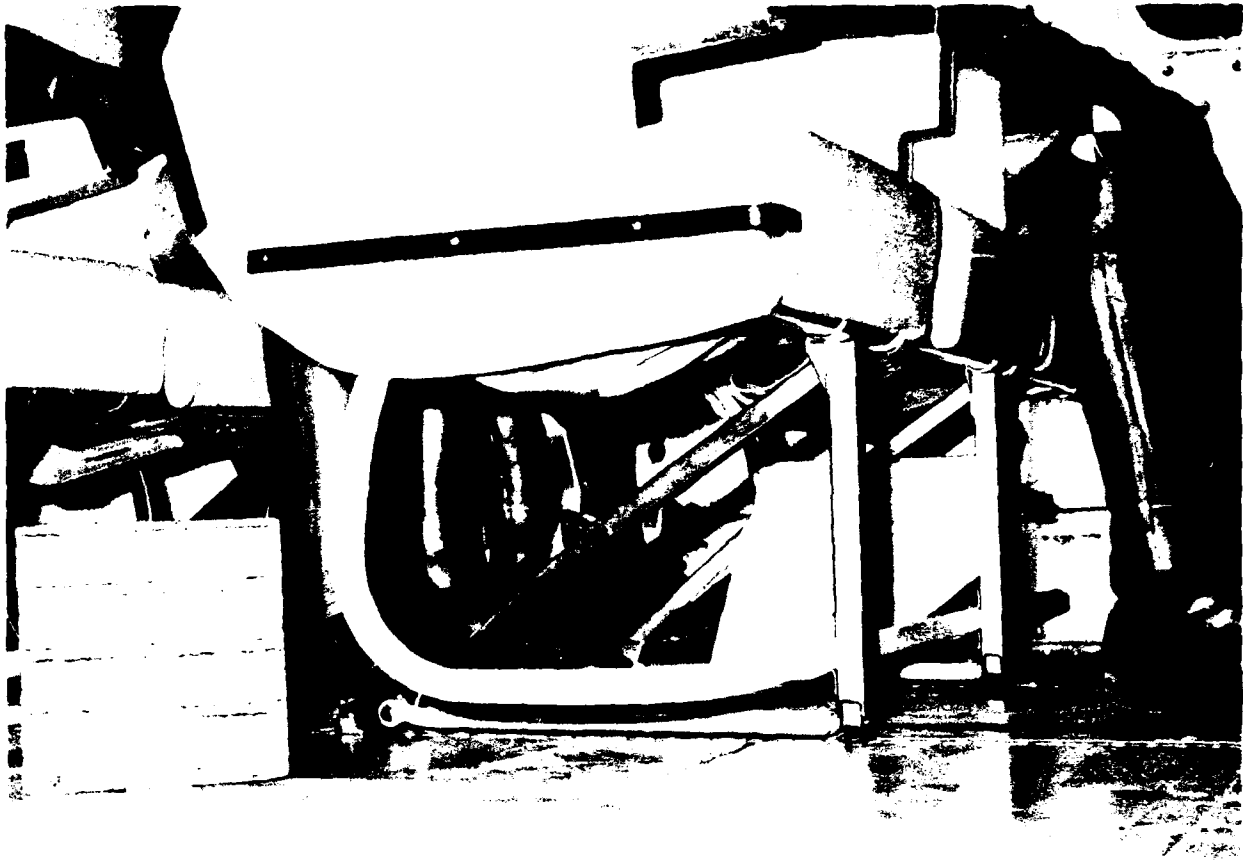


Figure 36. PRE-TEST FRONT SEAT/FLOOR ATTACHMENT

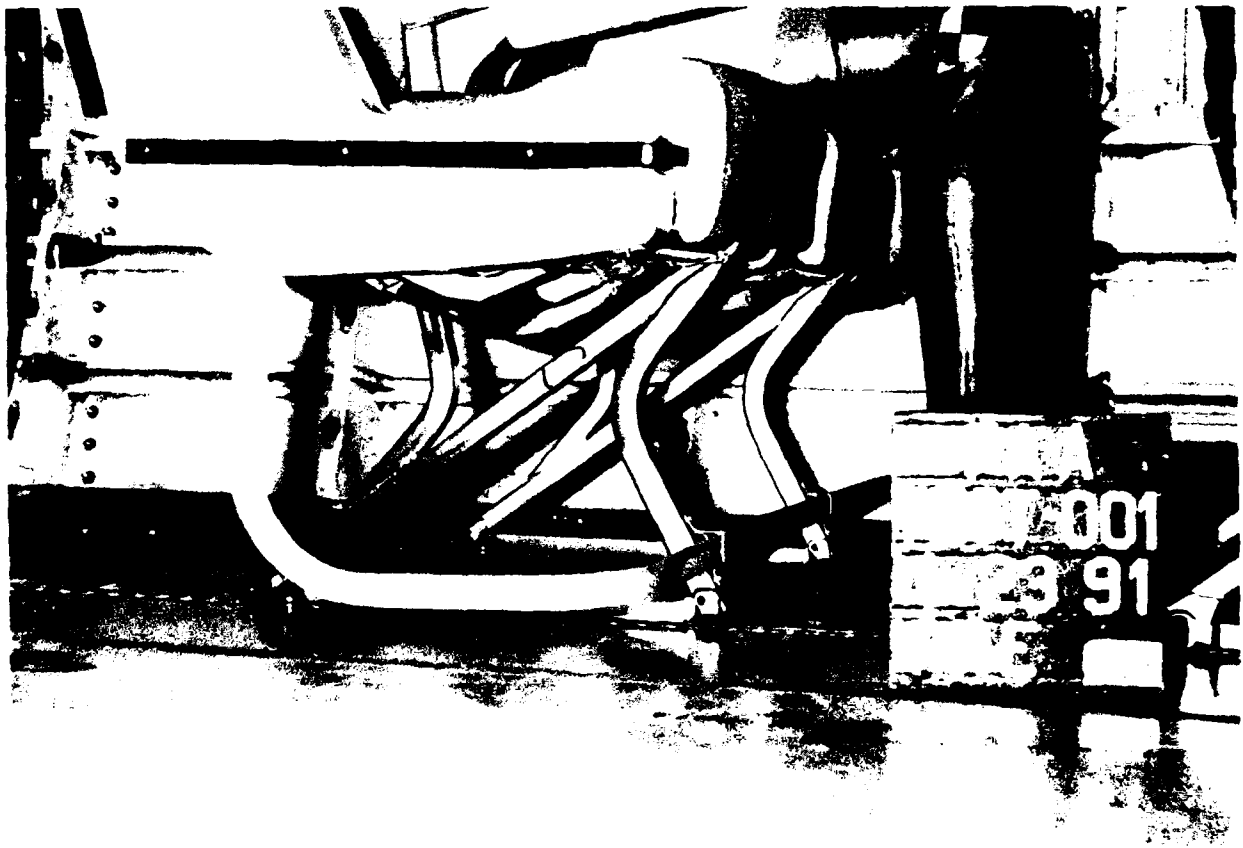


Figure 37. PRE-TEST REAR SEAT/FLOOR ATTACHMENT

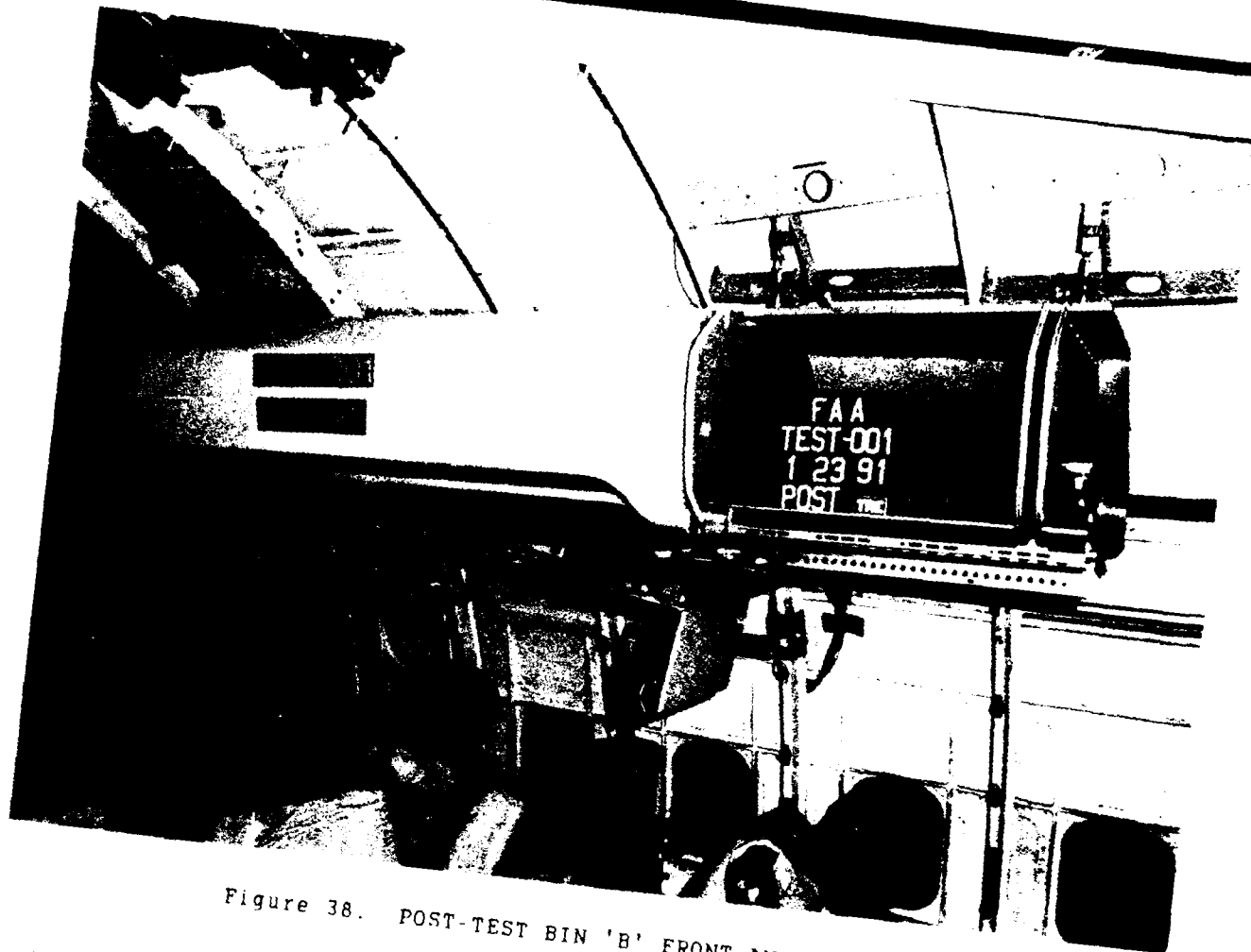


Figure 38. POST-TEST BIN 'B' FRONT ANGLE VIEW

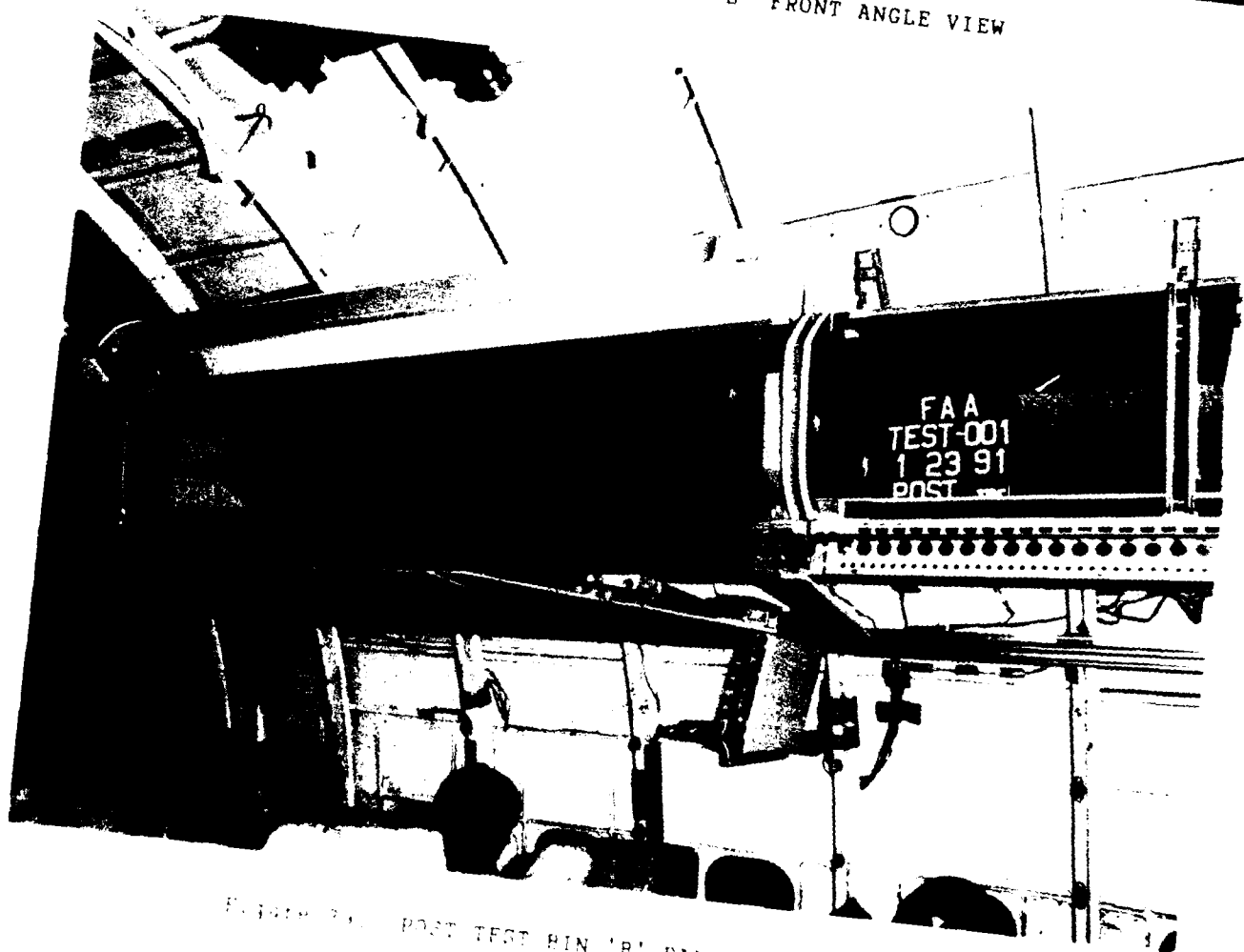


Figure 39. POST TEST BIN 'B' BALLAST POSITION

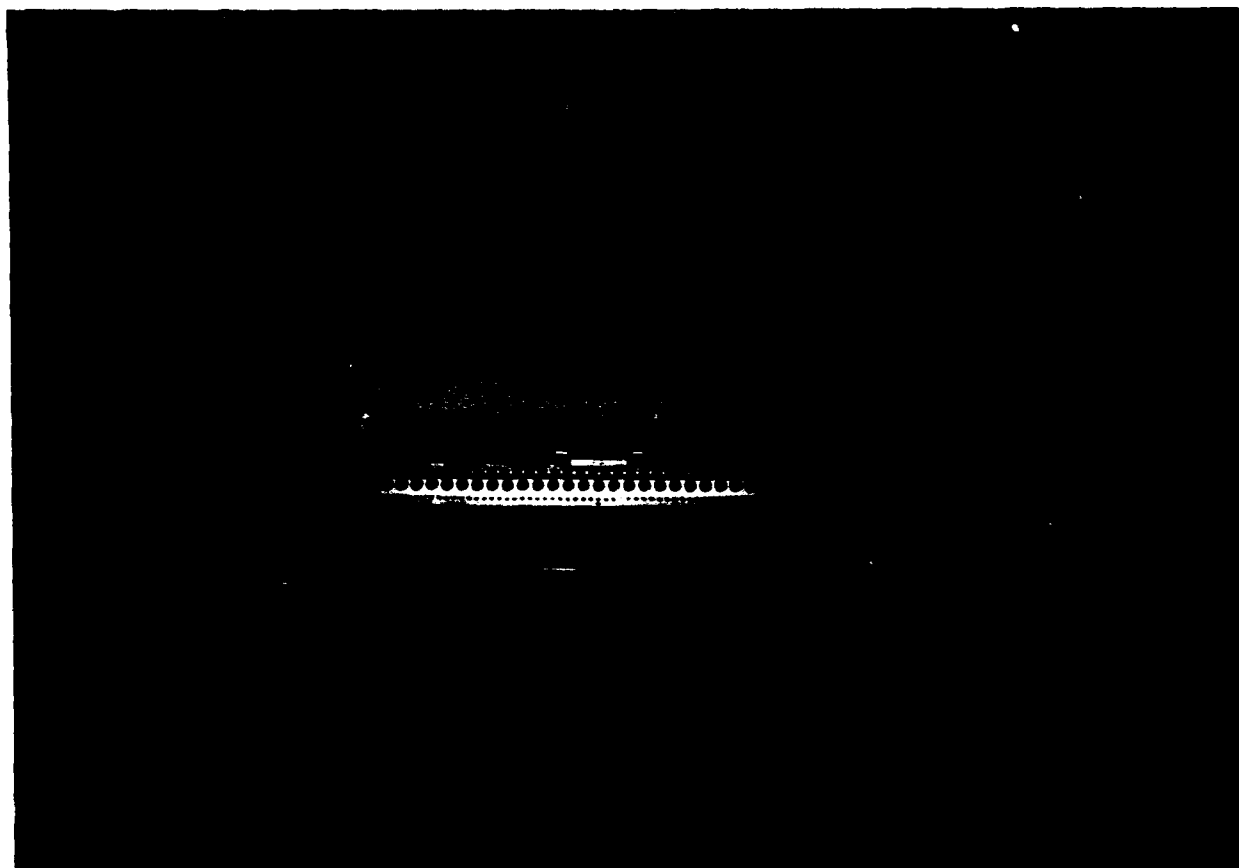


Figure 40. POST-TEST BIN 'B' OVERALL SIDE VIEW



Figure 41. POST TEST BIN 'B' REAR ANGLE VIEW

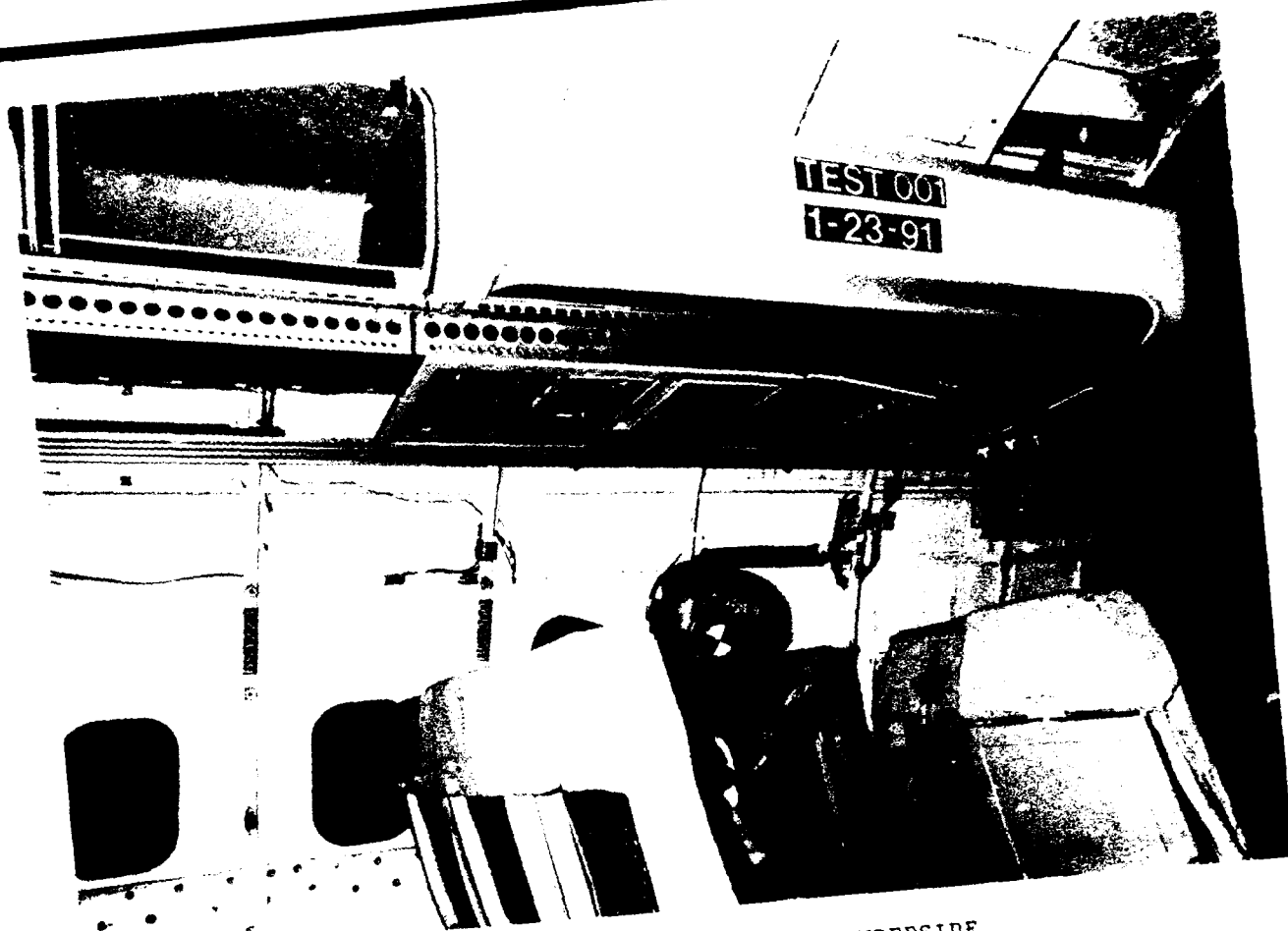


Figure 42. POST-TEST BIN 'B' UNDERSIDE

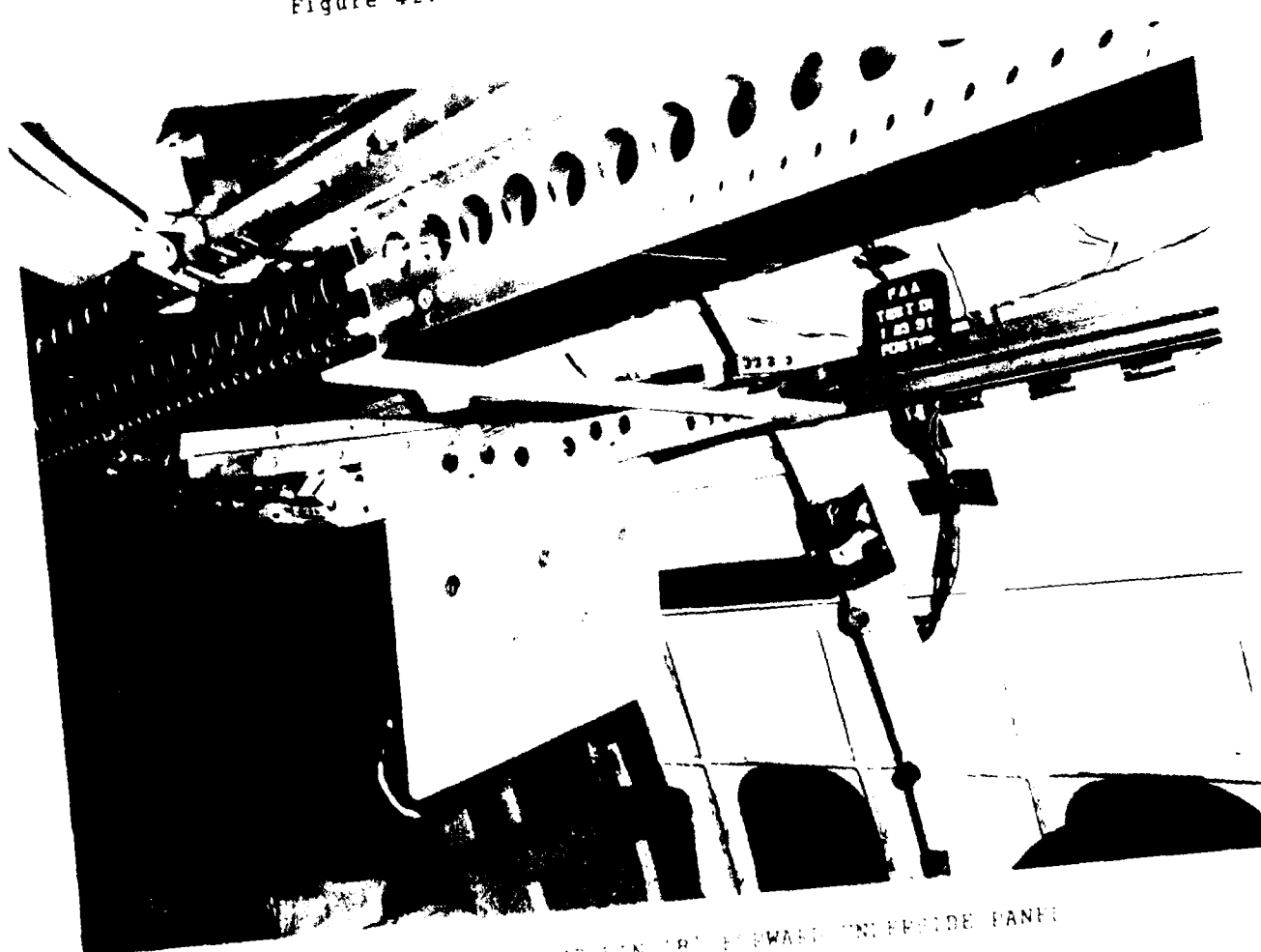


Figure 43. POST-TEST BIN 'B' FORWARD UNDERSIDE PANEL

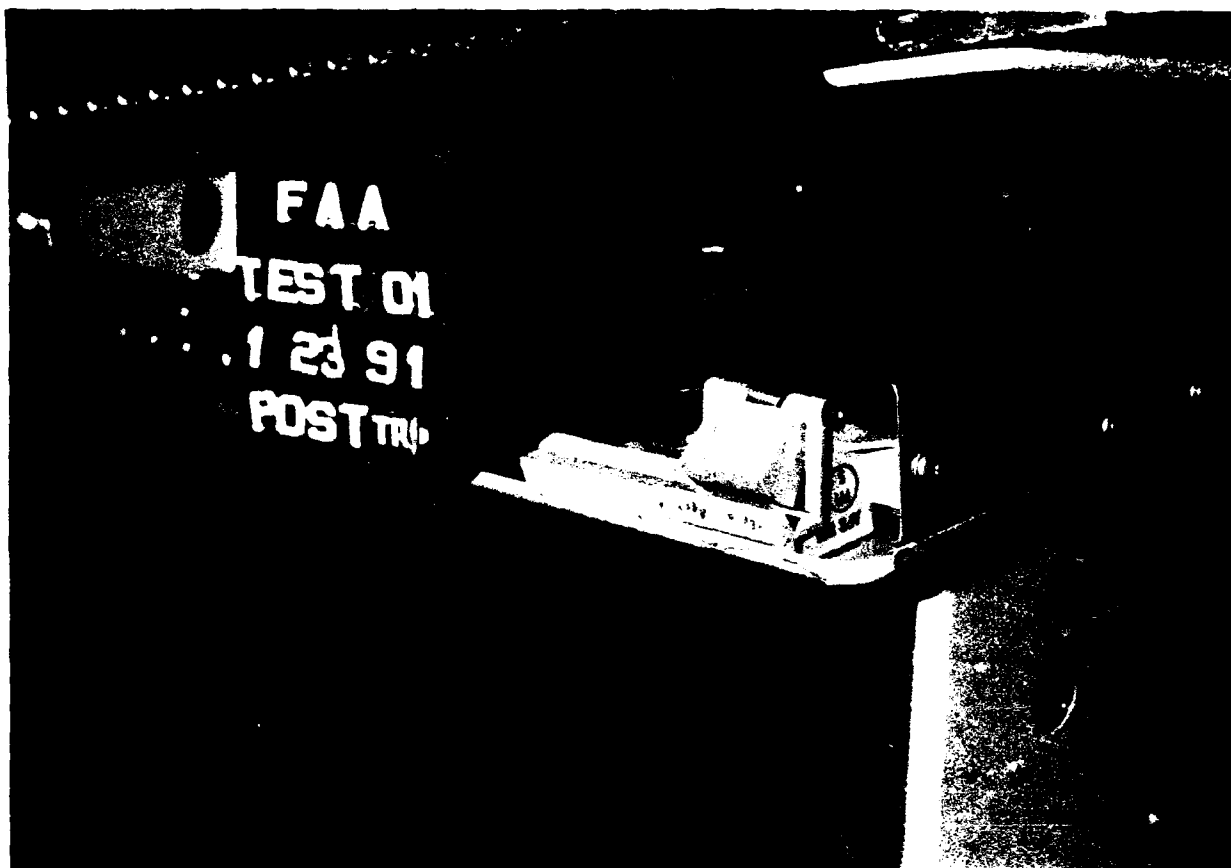


Figure 44. POST-TEST BIN 'B' FORWARD UNDERSIDE PANEL-FWD. LATCH CLOSE-UP

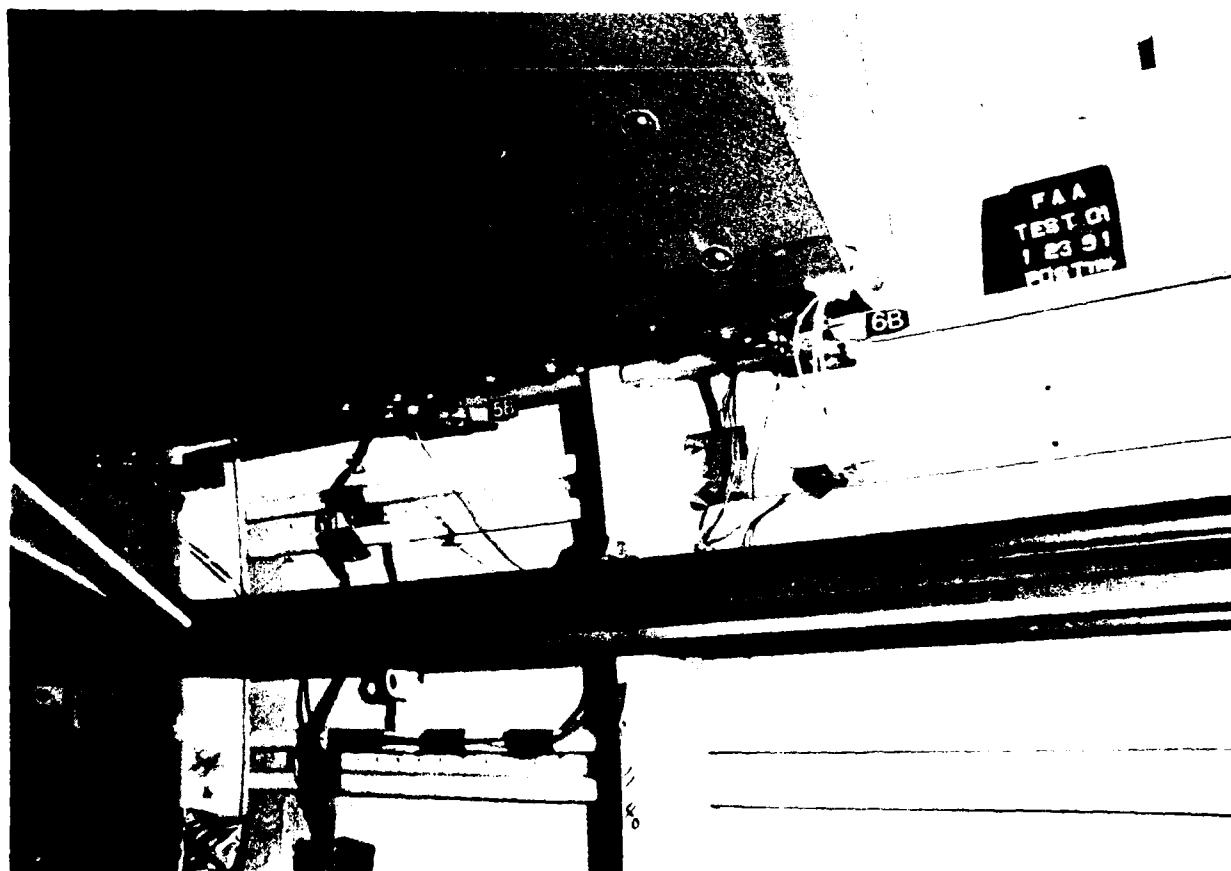




Figure 46. POST-TEST BIN 'P' LINK 4



Figure 47. POST-TEST BIN 'P' LINK 4 (Continued)

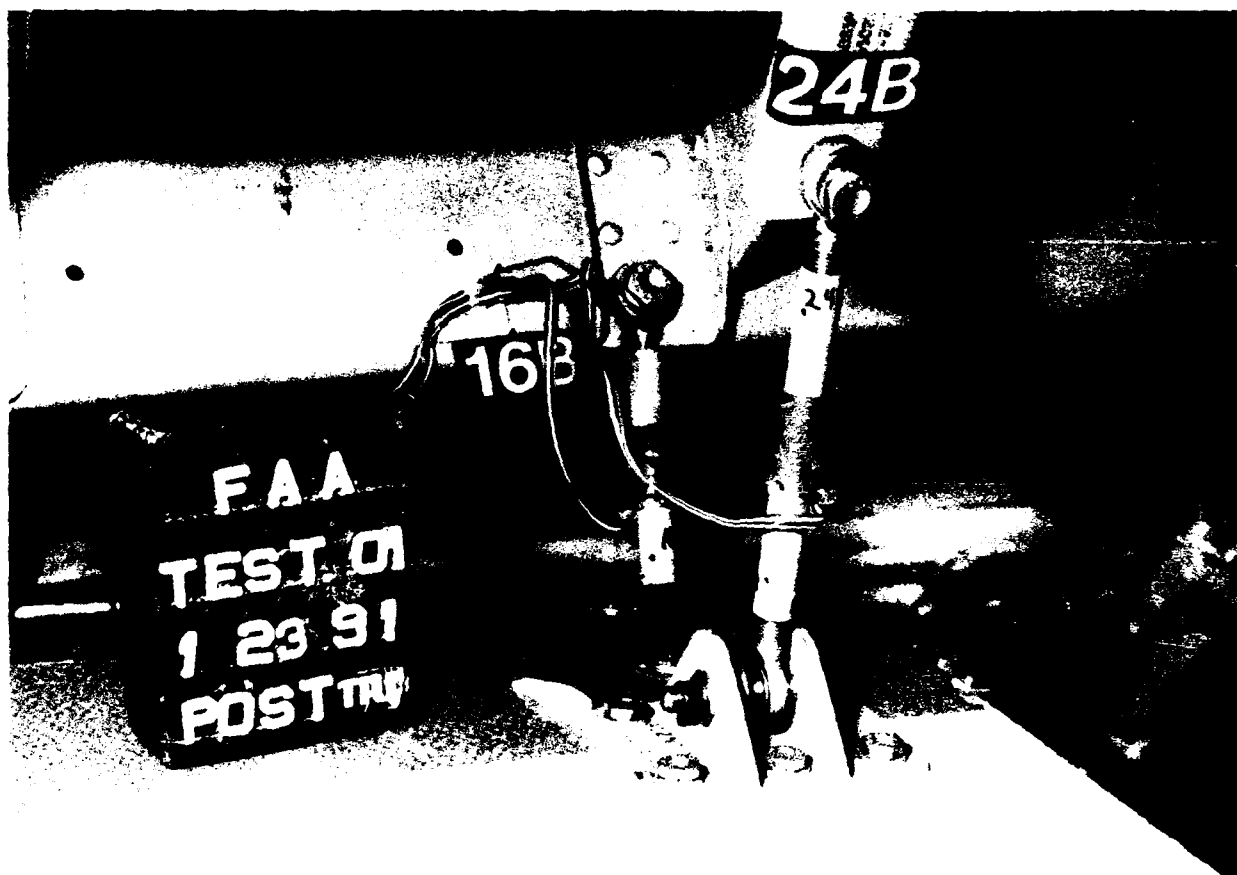


Figure 48. POST-TEST BIN 'B' LINKS 16 AND 24



Figure 49. POST-TEST BIN 'B' LINKS 16 AND 24

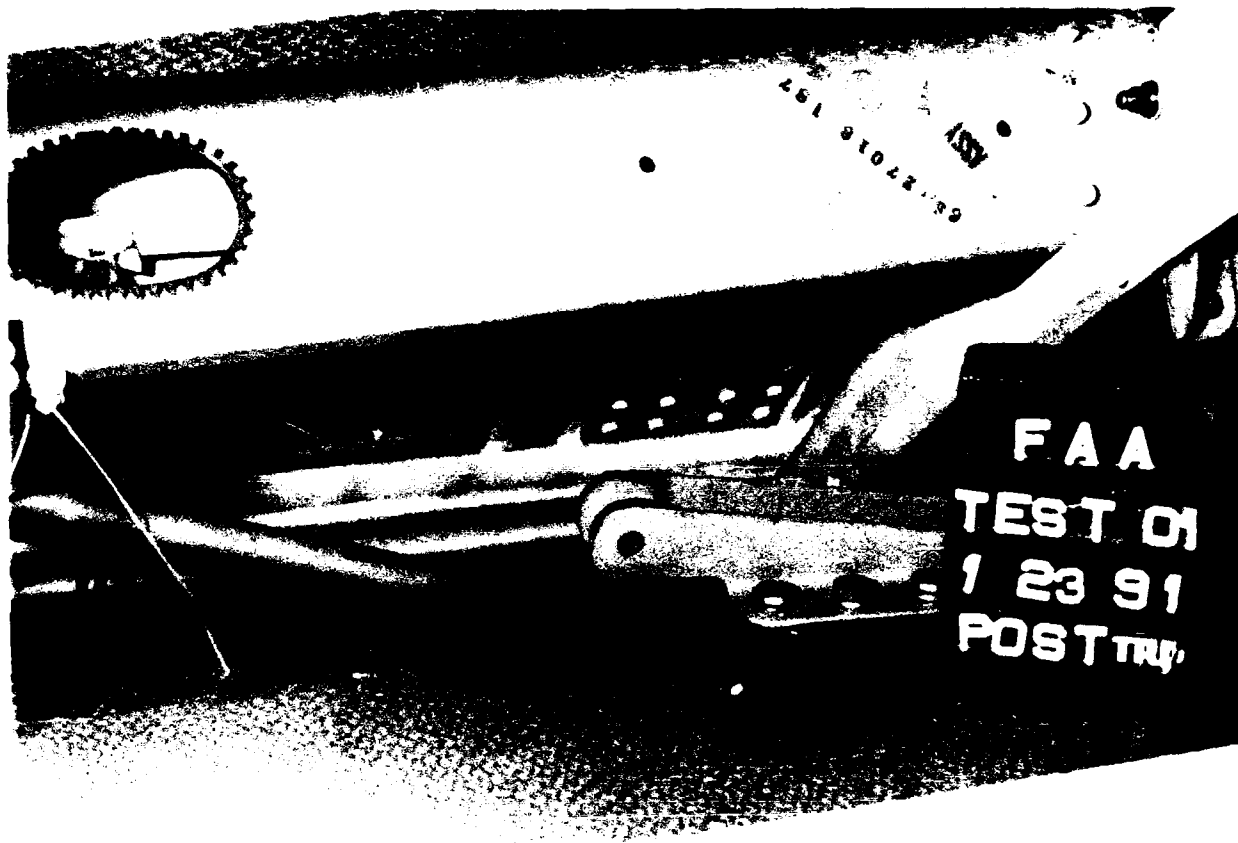


Figure 50. POST-TEST BIN 'B' FORWARD 20" BIN DRAG LINK FITTING/FUSELAGE CONTACT

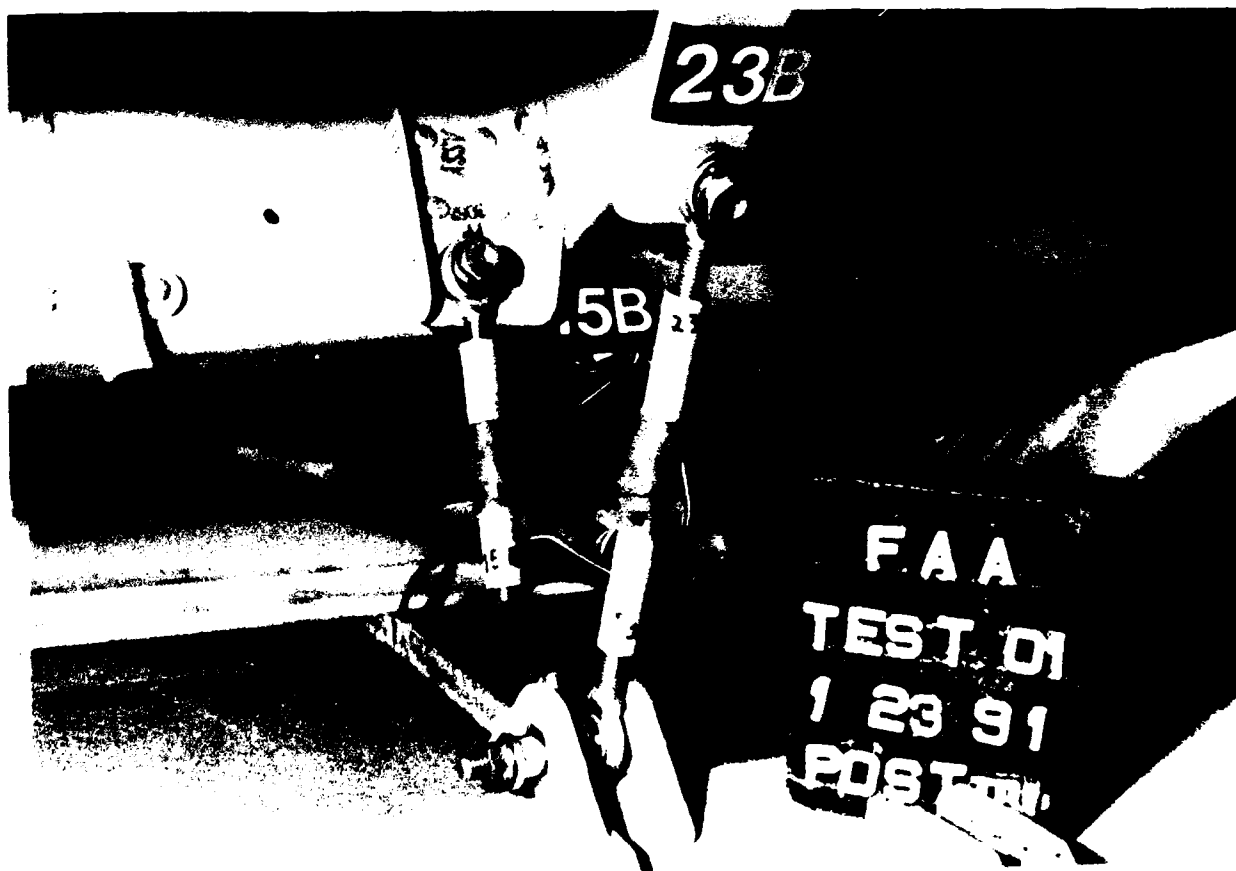


Figure 51. POST-TEST BIN 'B' LINES 15 AND 23

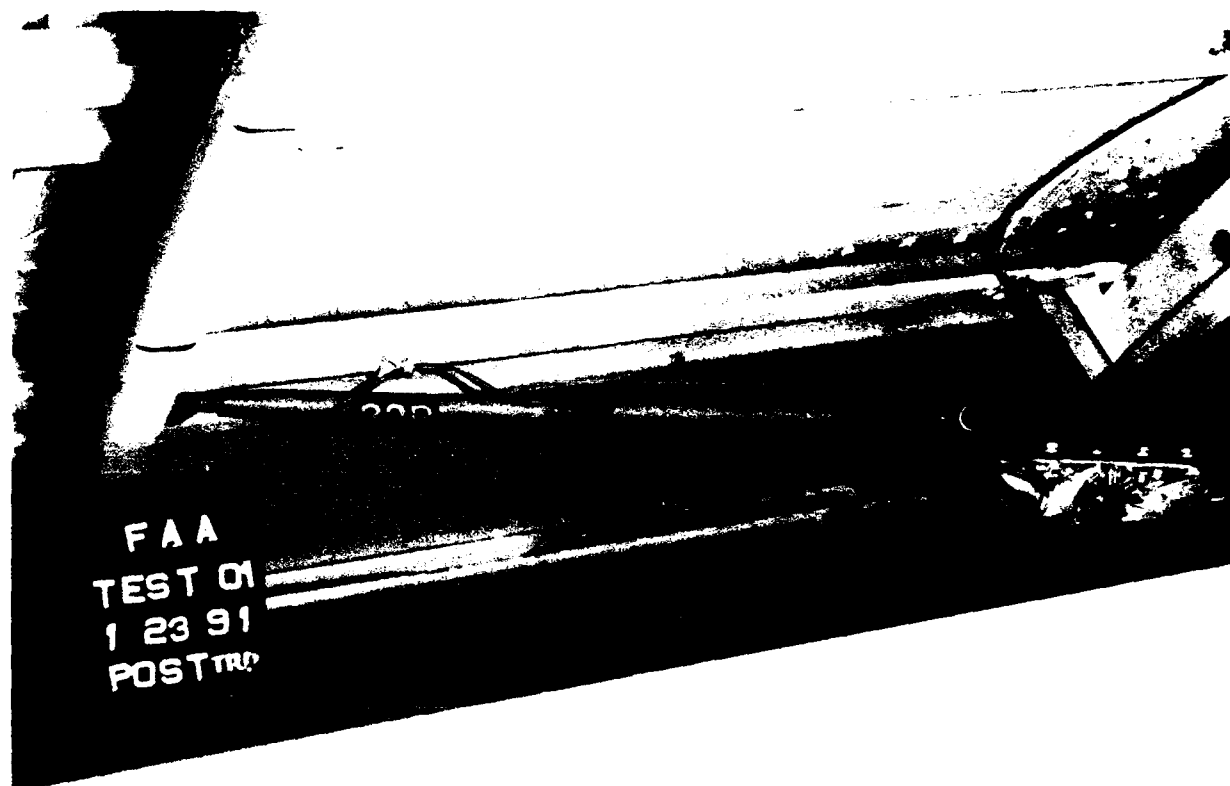


Figure 52. POST-TEST BIN 'B' LINK 32



Figure 53. POST-TEST BIN 'B' LINK 32 BIN ATTACHMENT

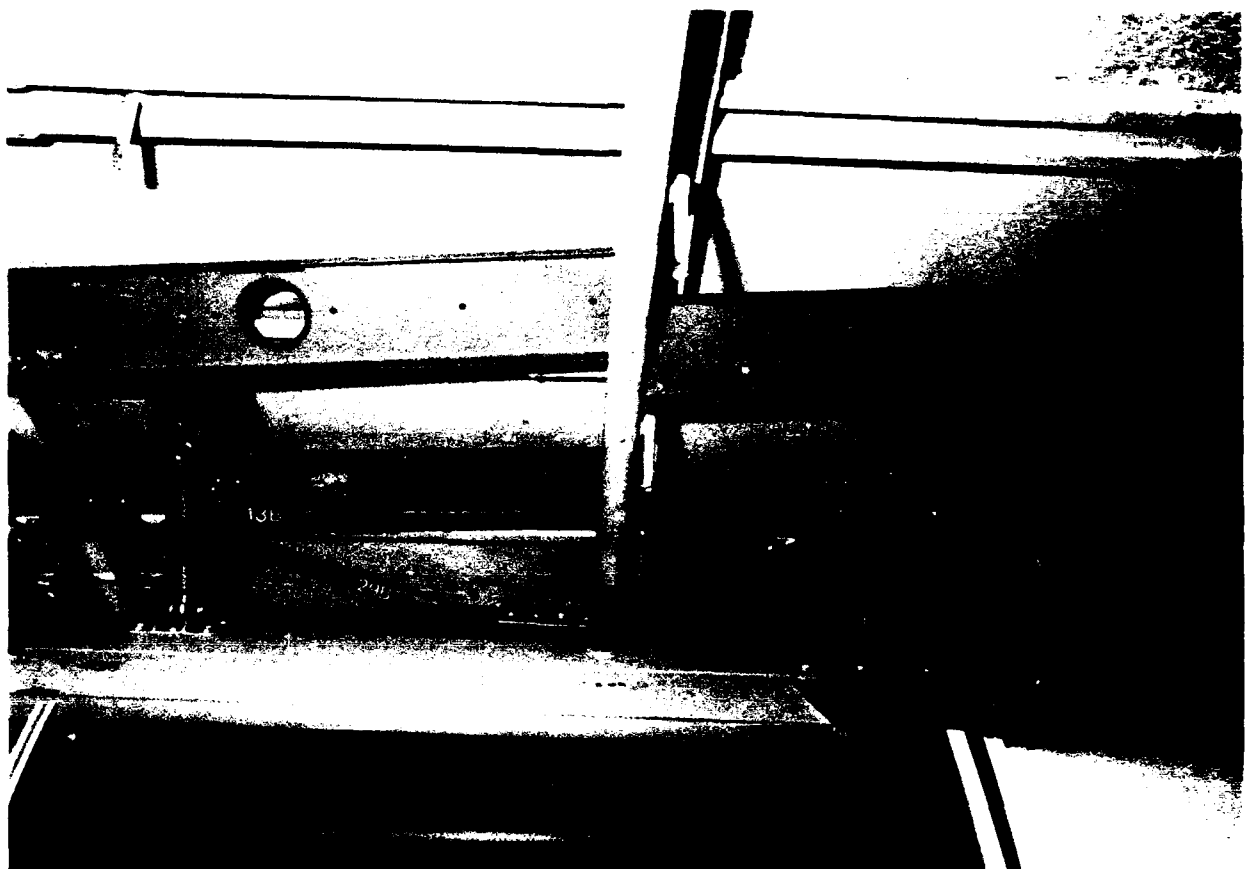


Figure 54. POST-TEST BIN 'B' LINKS 13, 14, 21, AND 22

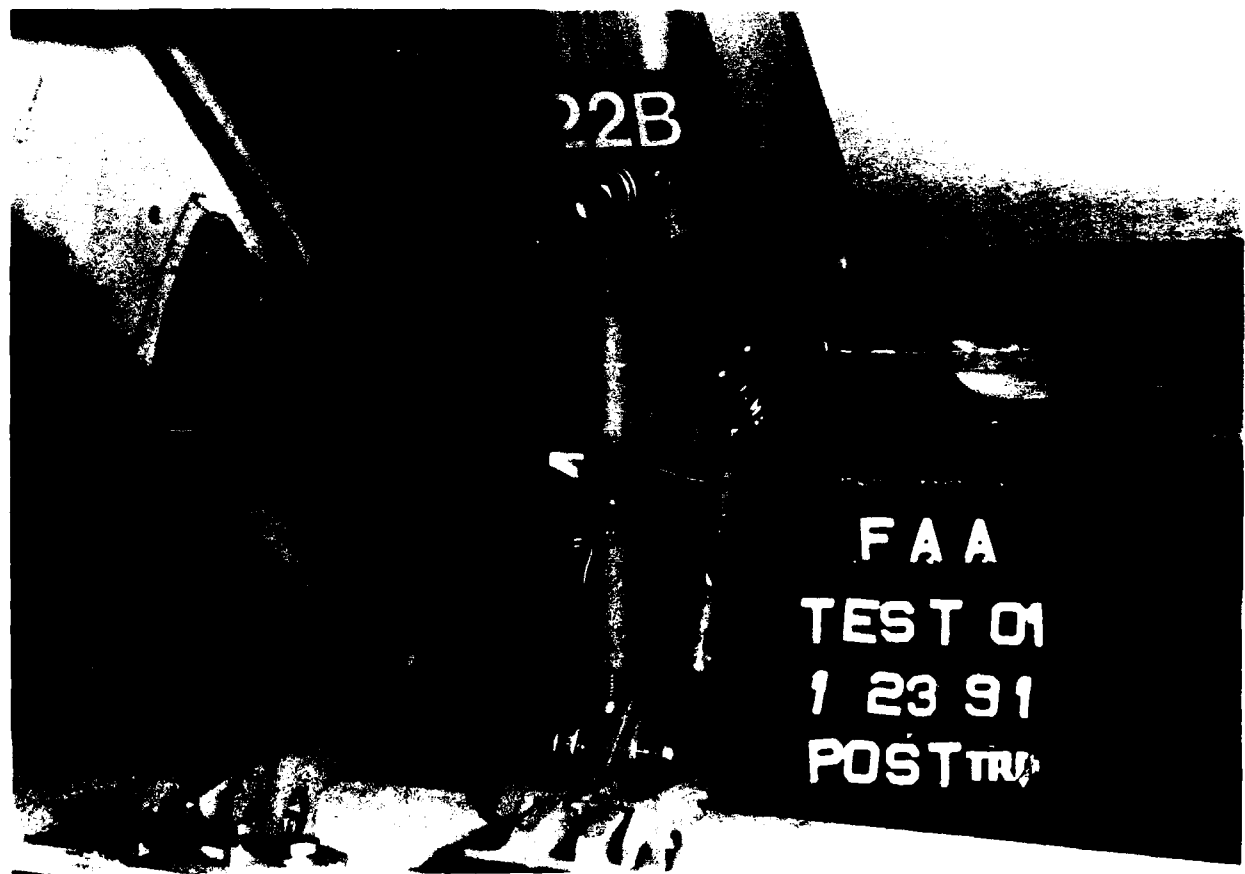


Figure 55. POST-TEST BIN 'B' LINKS 14 AND 22

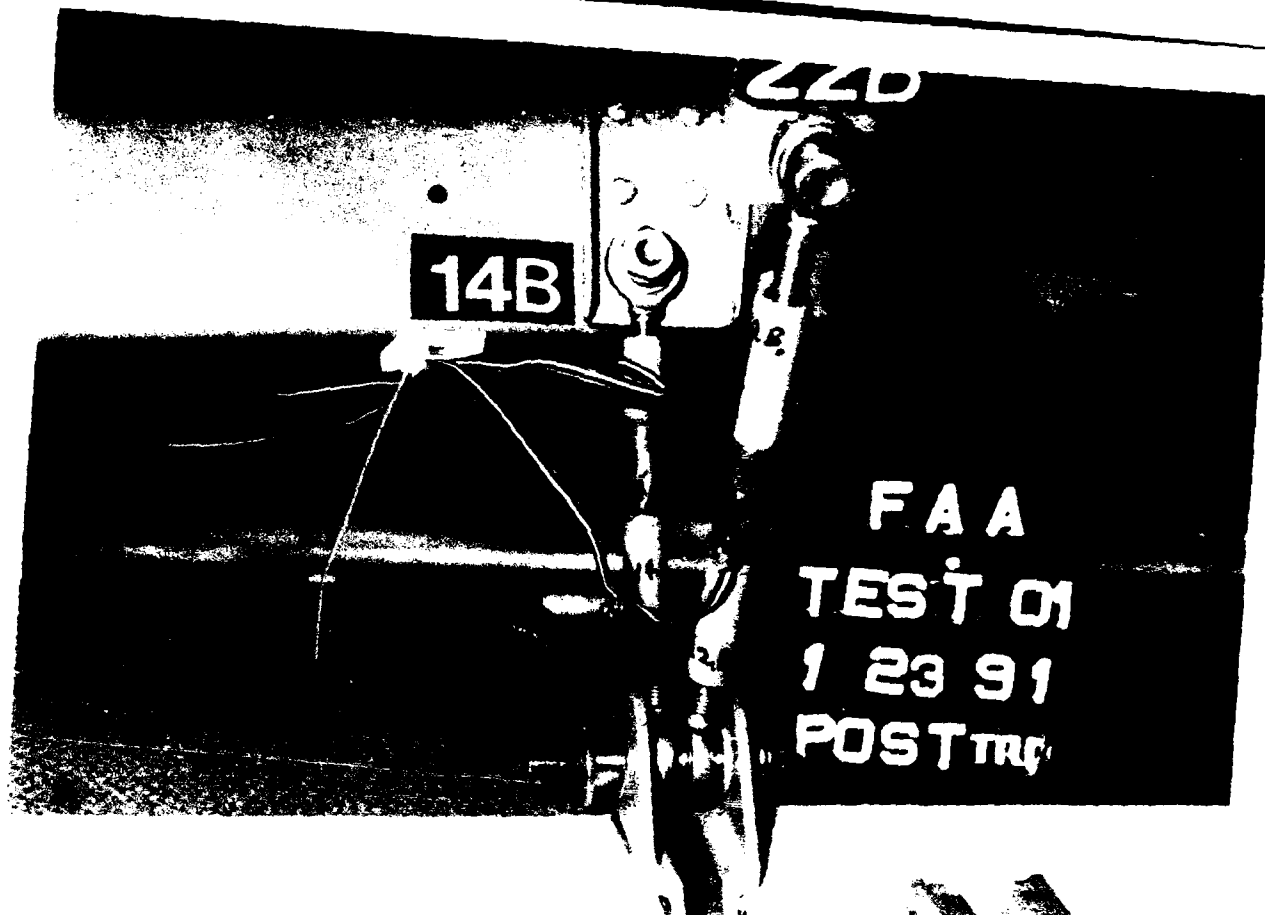


Figure 5b. POST TEST BIN 'B' LINK 14 CLOSE UP

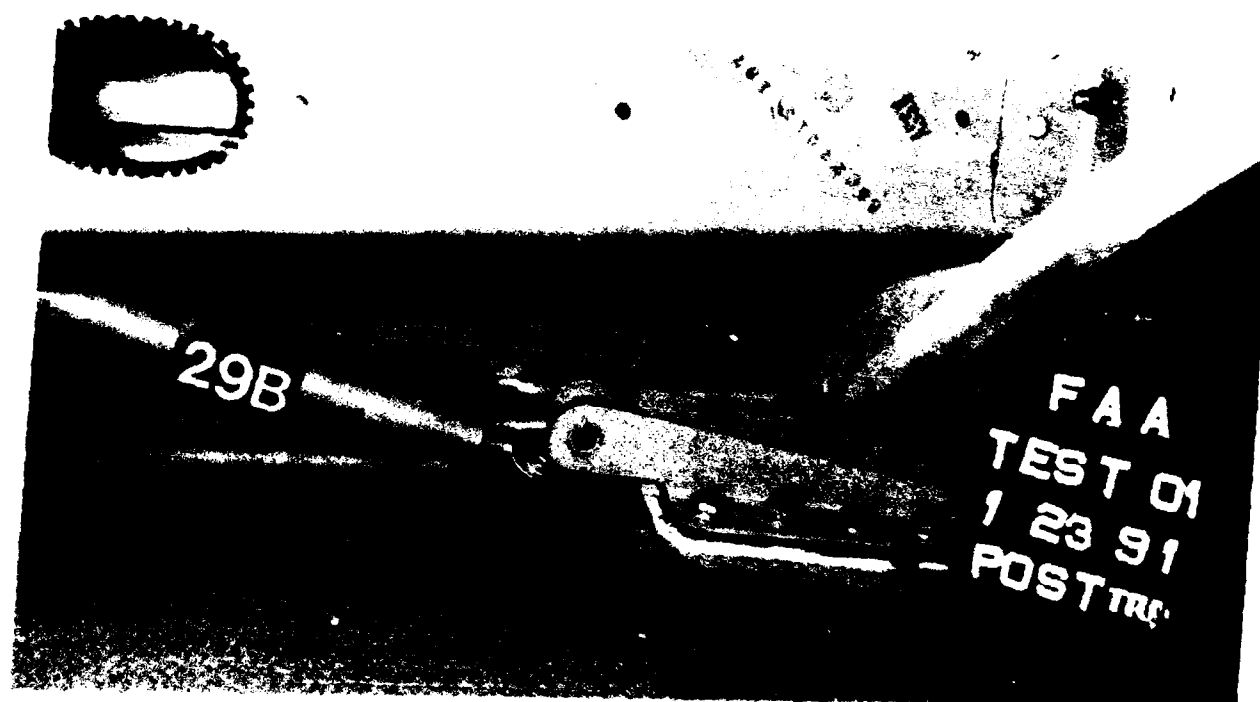


Figure 5c.

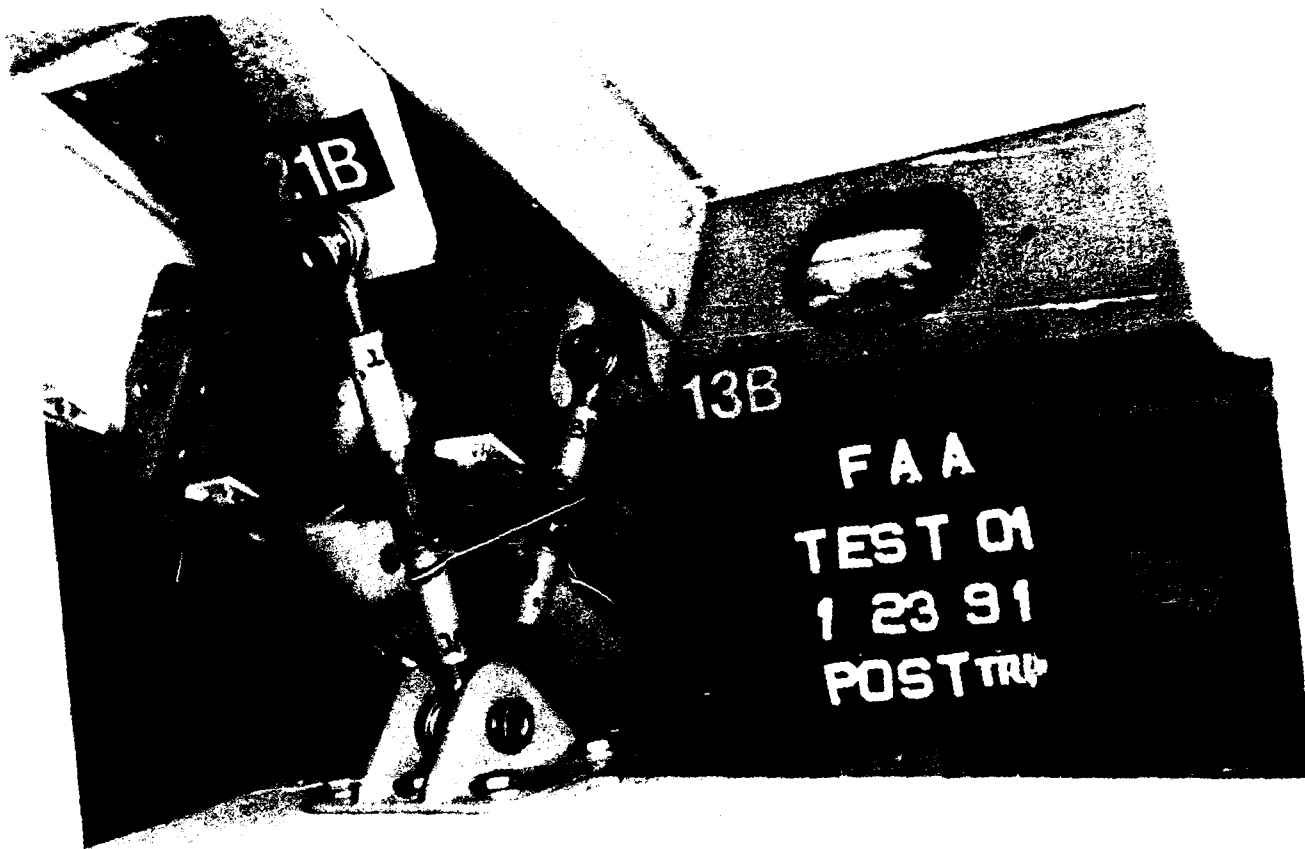


Figure 58. POST-TEST BIN 'B' LINKS 13 AND 21



Figure 59. POST-TEST BIN 'B' LINK 13 CLOSE-UP

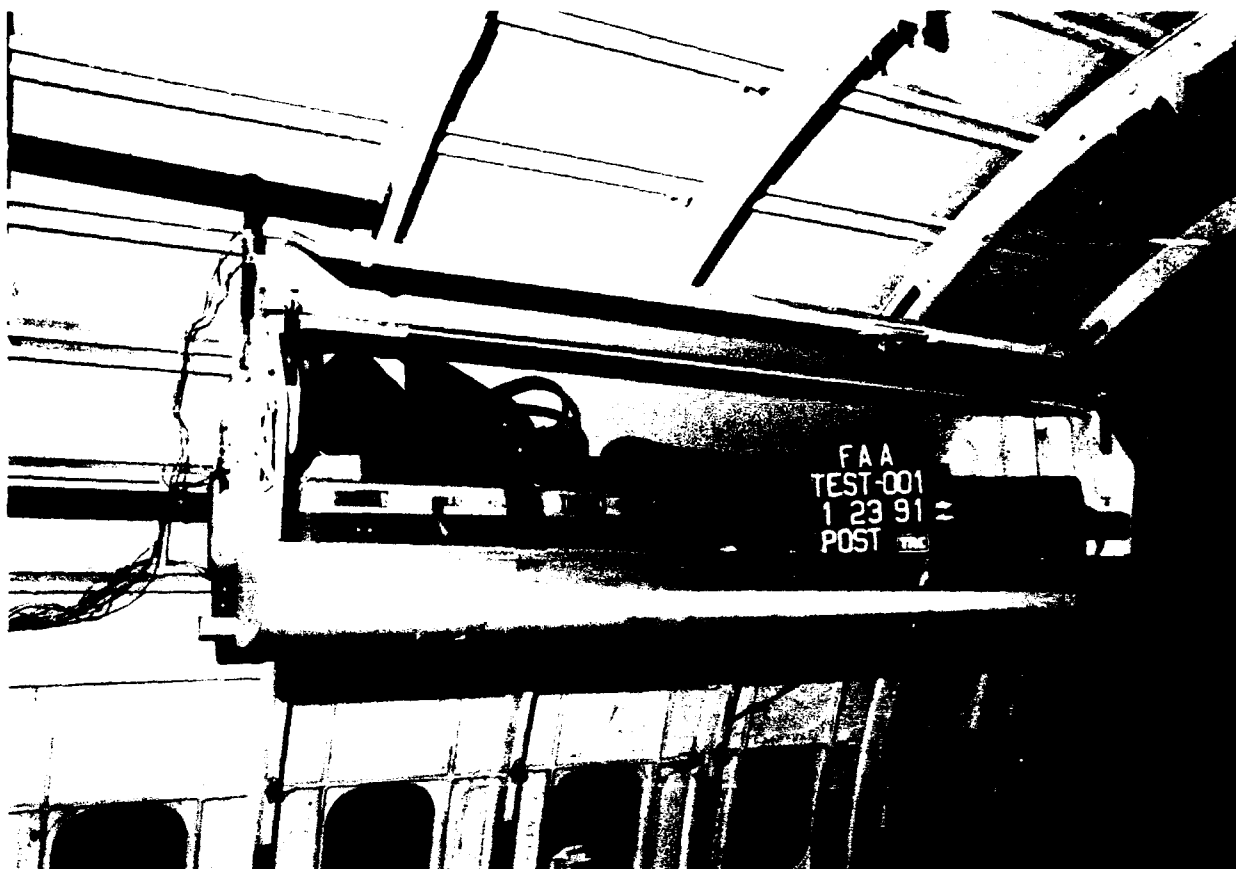


Figure 60. POST-TEST BIN 'A' BALLAST POSITION



Figure 61. POST TEST BIN 'A' FORWARD STRUCTURE FRONT ANGLE VIEW

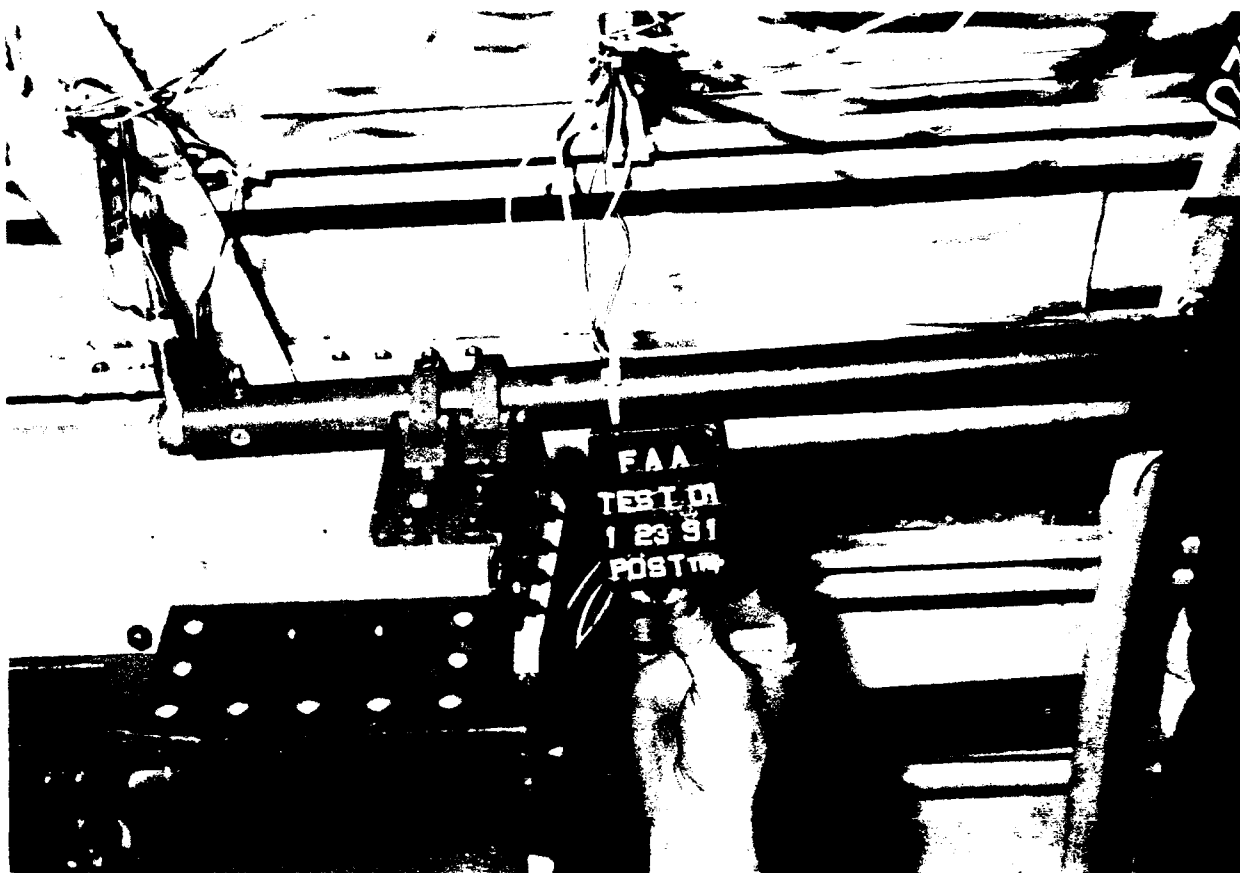


Figure 62. POST-TEST BIN 'A' FRONT SUPPORT BAR

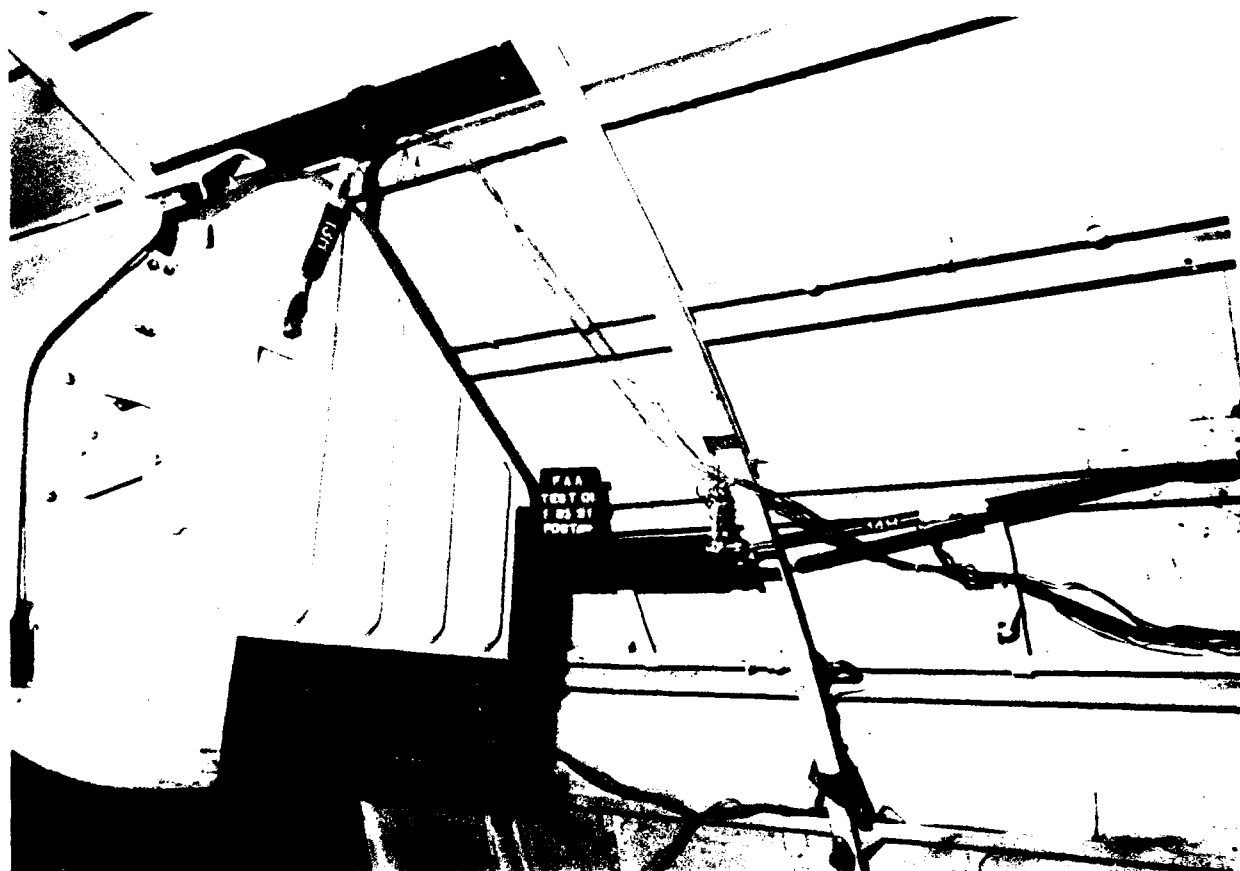


Figure 63. POST-TEST BIN 'A' FRONT SUPPORT BAR ANGLE VIEW

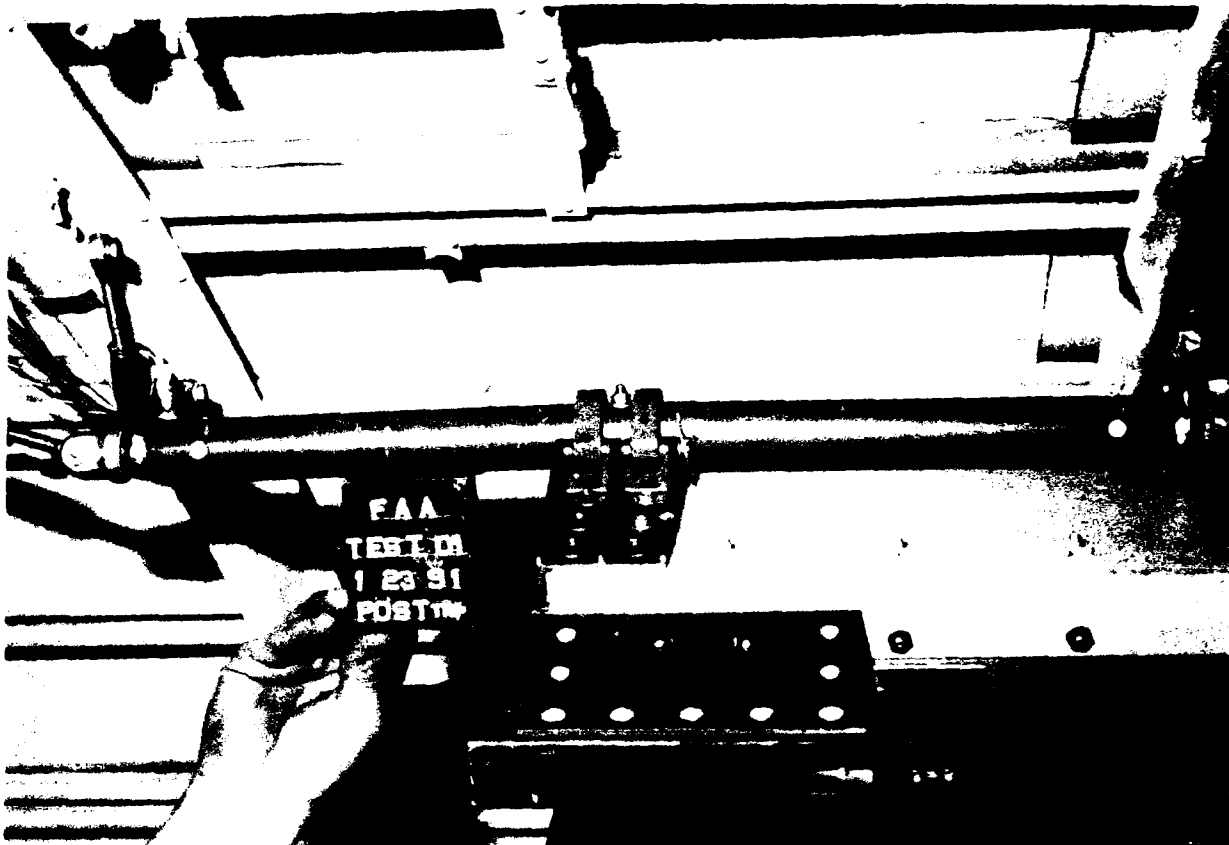


FIGURE 64. POST TEST BIN 'A' REAR SUPPORT BAR

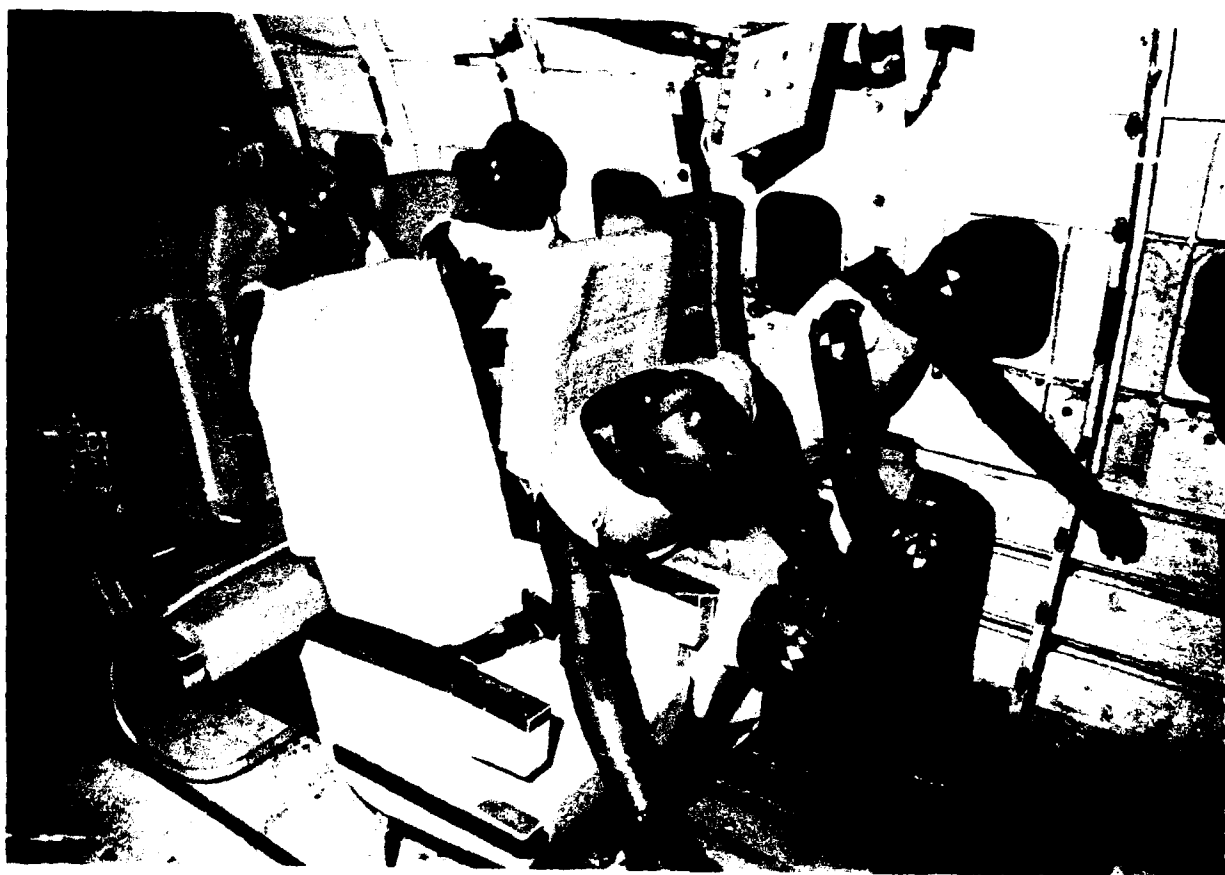


FIGURE 65. POST TEST BIN 'A' REAR SUPPORT BAR



Figure 66. TEST TEST SEATS AND SUMMARY VIEW

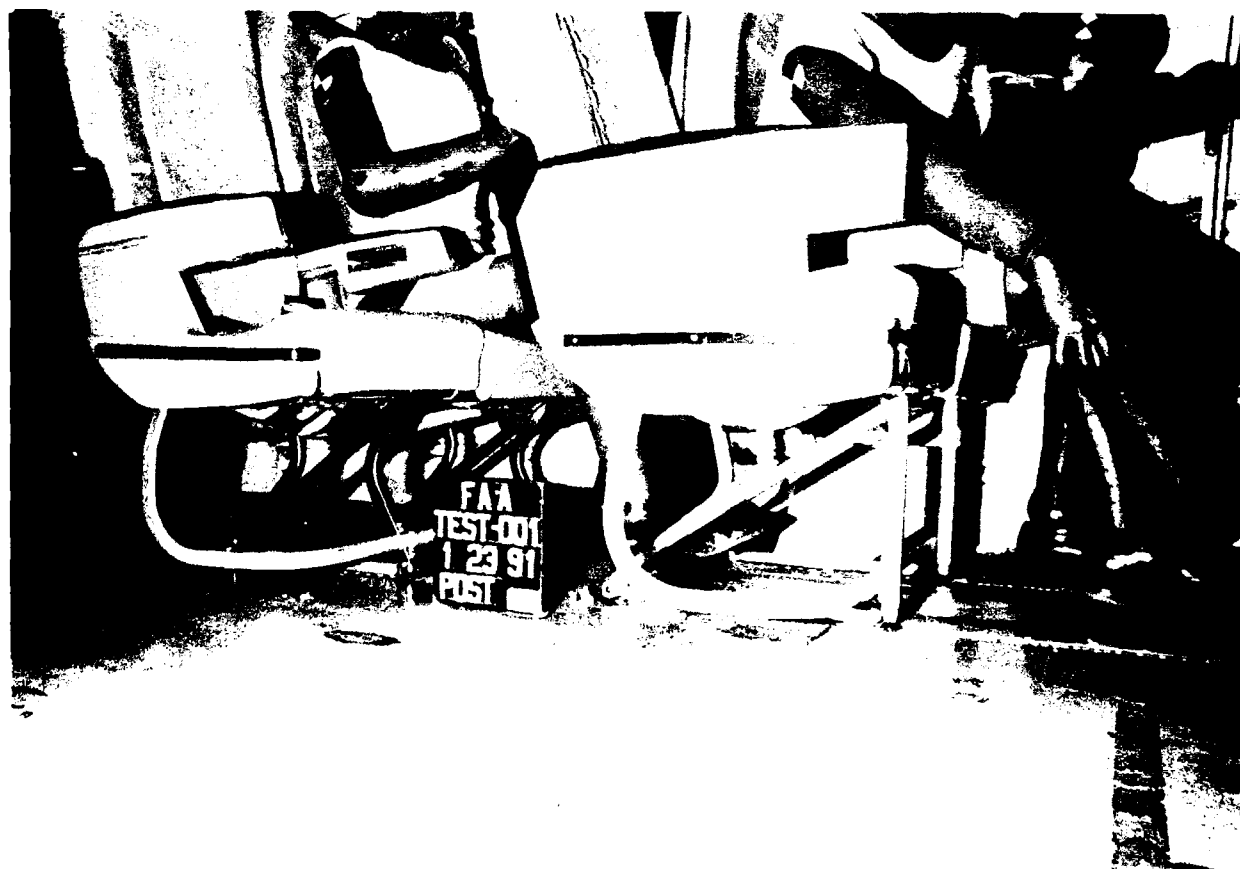




Figure 68. POST-TEST REAR DUMMY CONTACT WITH FRONT SEAT

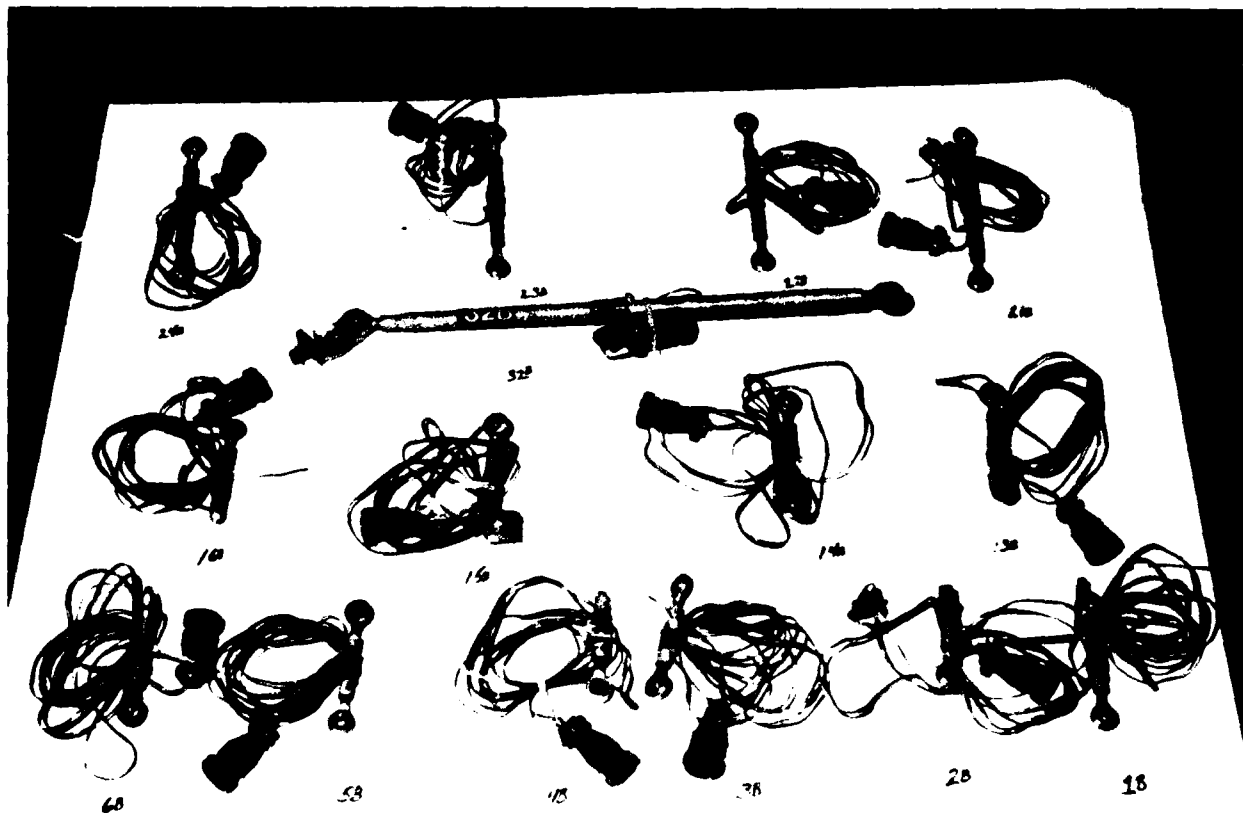


FIGURE 69. POST-TEST PIN 'B' LINKS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100. AND 32B REMOVED FROM TEST FIXTURE

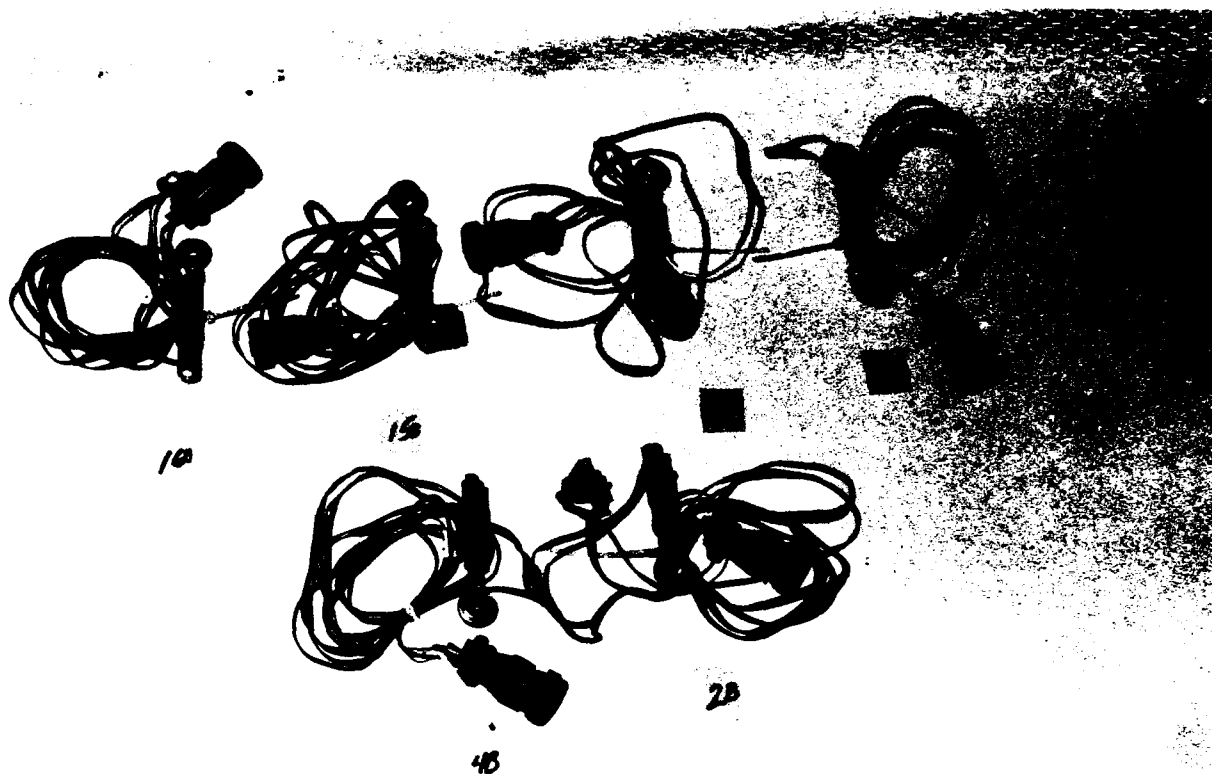


Figure 70. POST-TEST BIN 'B' LINKS 2, 4, 13, 14, 15, AND 16 REMOVED FROM TEST FIXTURE

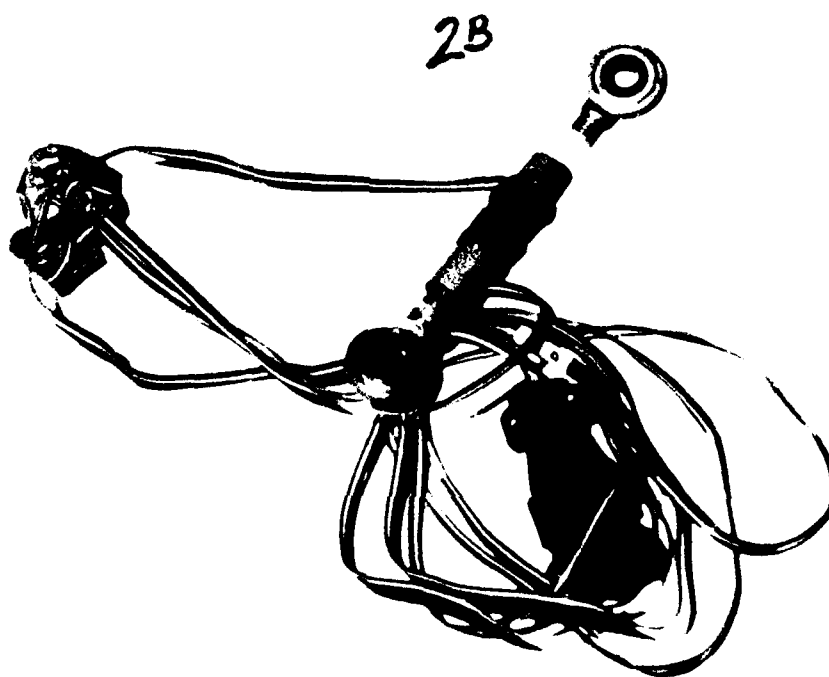


Figure 71. POST TEST BIN 'B' LINK 2 CLOSE UP REMOVED FROM TEST FIXTURE

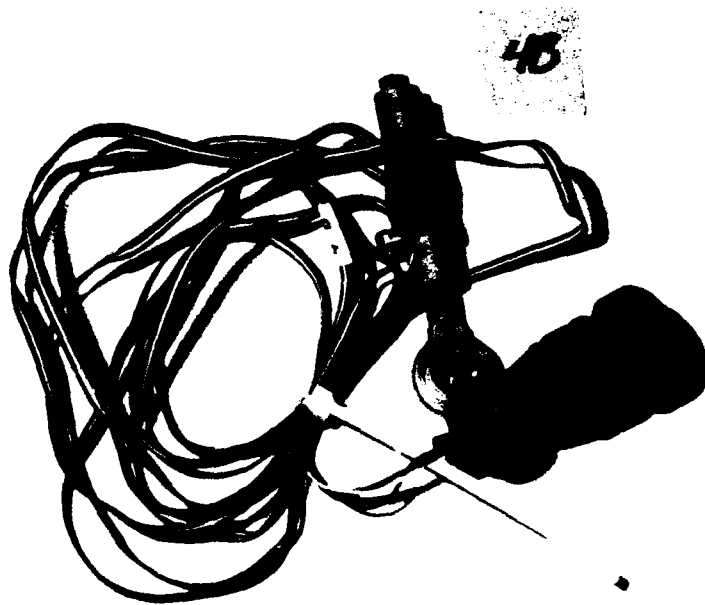


Figure 72. POST-TEST BIN 'B' LINK 4 CLOSE-UP REMOVED FROM TEST FIXTURE

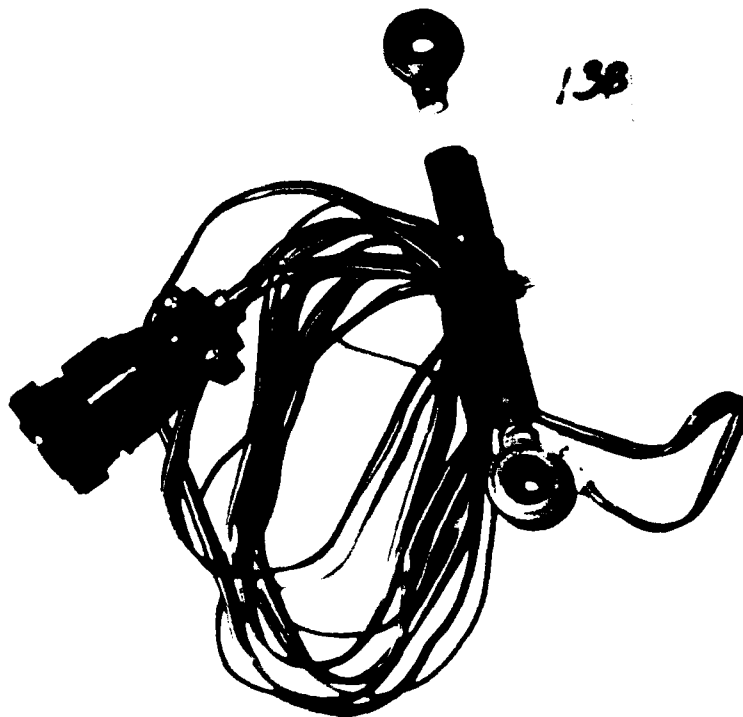


Figure 73. POST TEST BIN 'B' LINK 13 CLOSE UP REMOVED FROM TEST FIXTURE

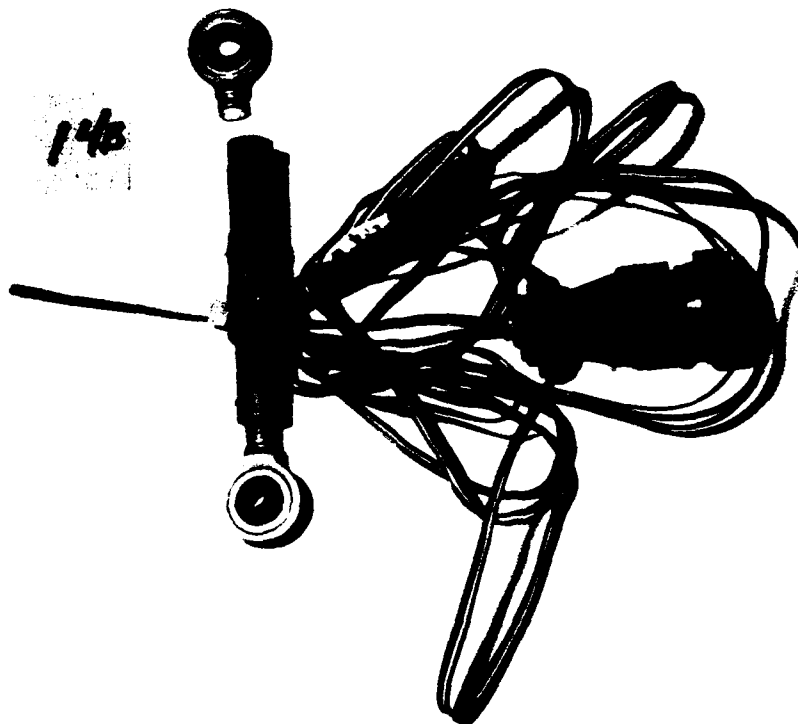


Figure 74. POST-TEST BIN 'B' LINK 14 CLOSE-UP REMOVED FROM TEST FIXTURE

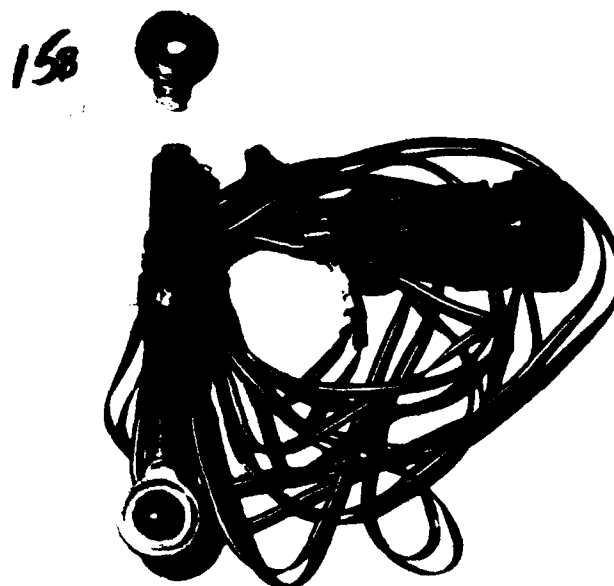


Figure 75. POST-TEST BIN 'B' LINK 15 CLOSE-UP REMOVED FROM TEST FIXTURE

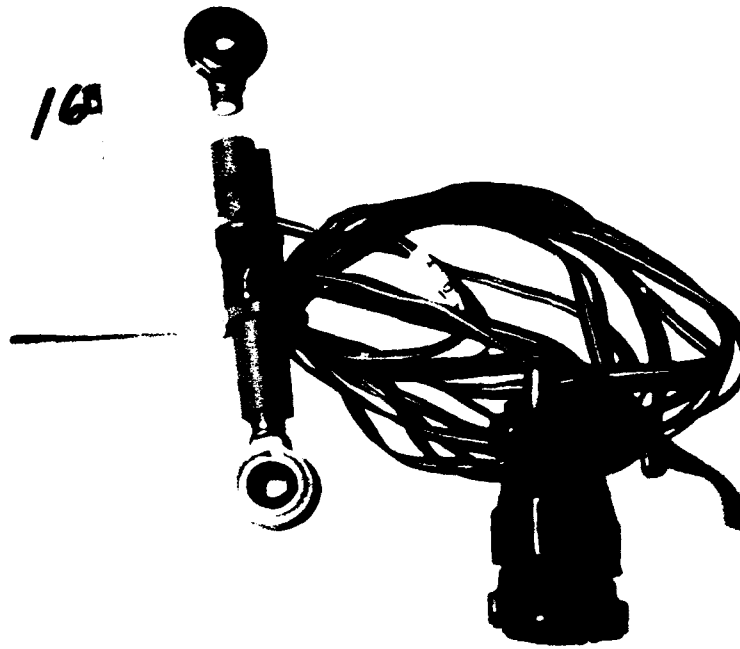


Figure 76. POST-TEST BIN 'B' LINK 16 CLOSE-UP REMOVED FROM TEST FIXTURE

TEST 002

(FIGURES 77 THROUGH 116)

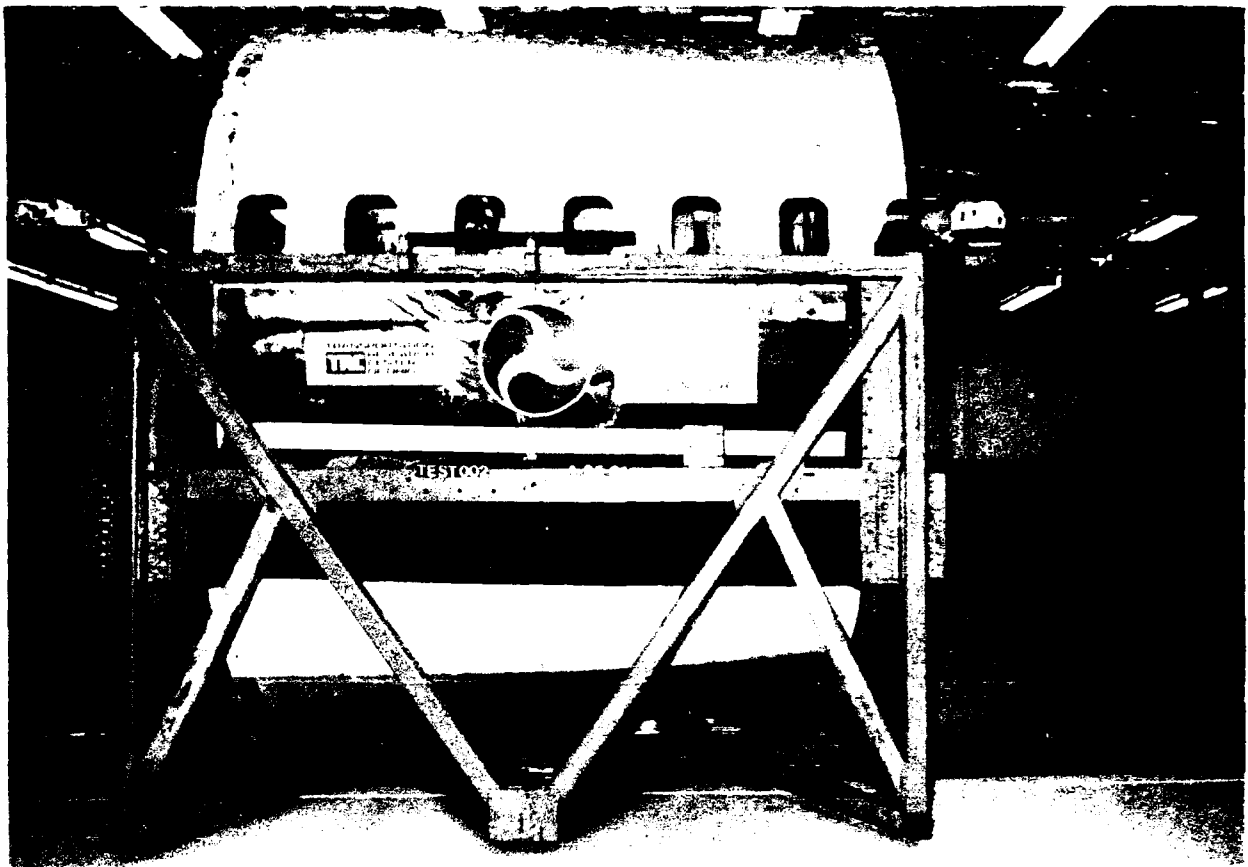


Figure 77. PRE-TEST OVERALL LEFT SIDE VIEW

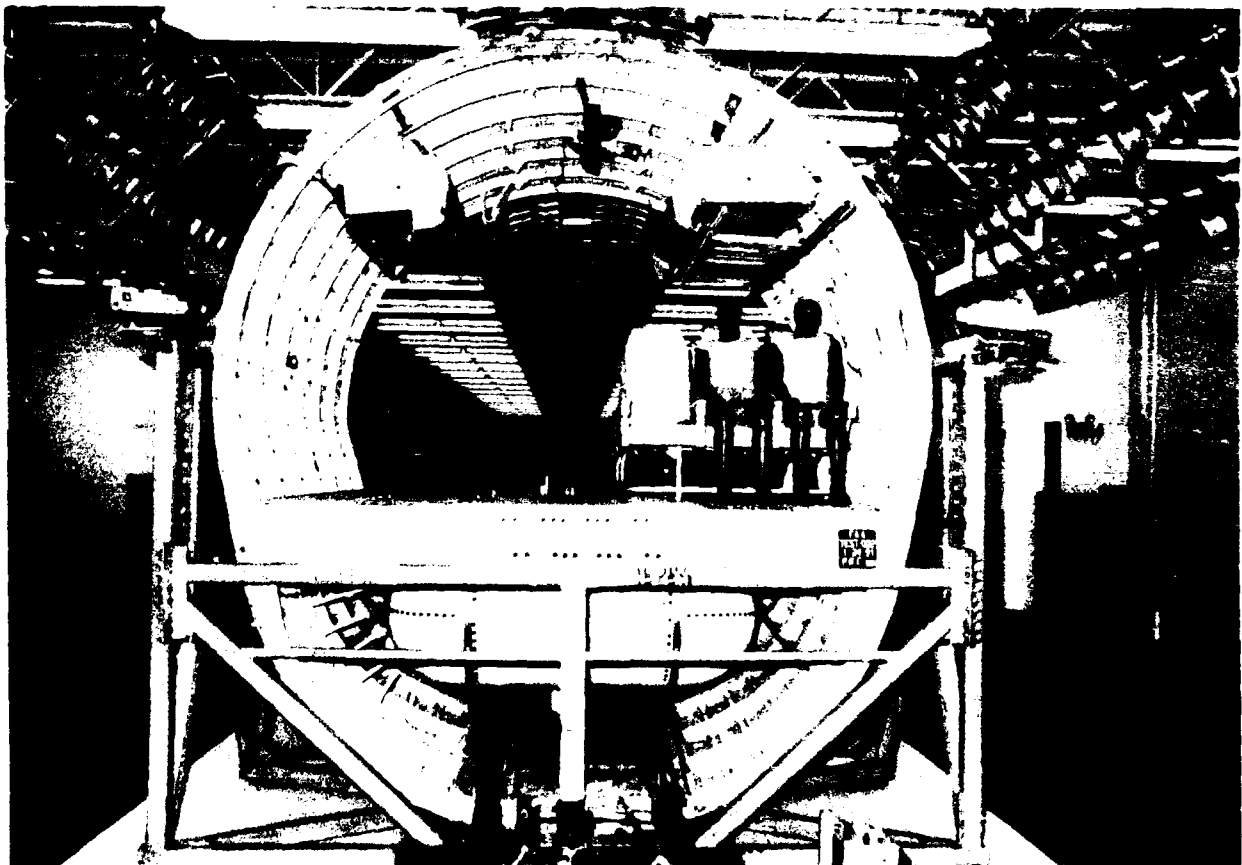


Figure 78. PRE-TEST OVERALL FRONT VIEW

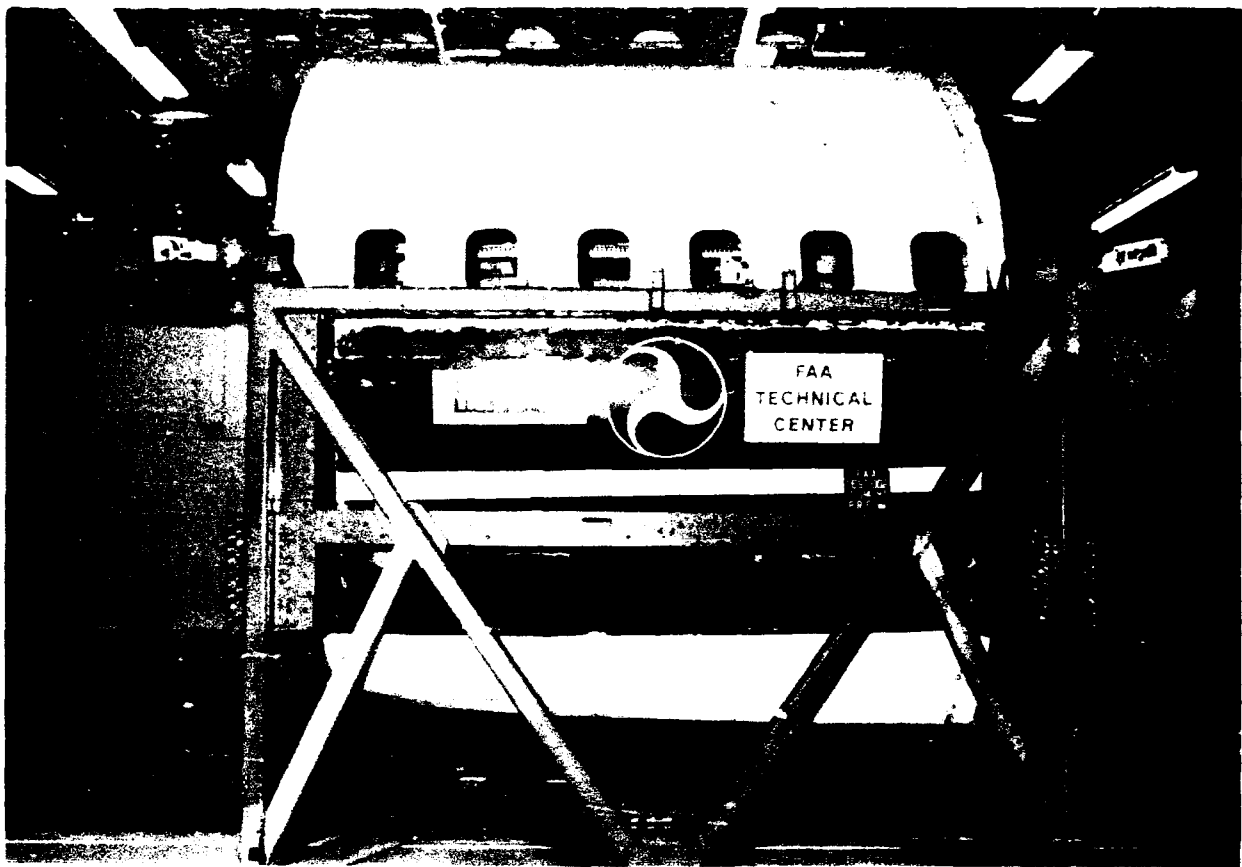


Figure 79. PRE-TEST OVERALL RIGHT SIDE VIEW

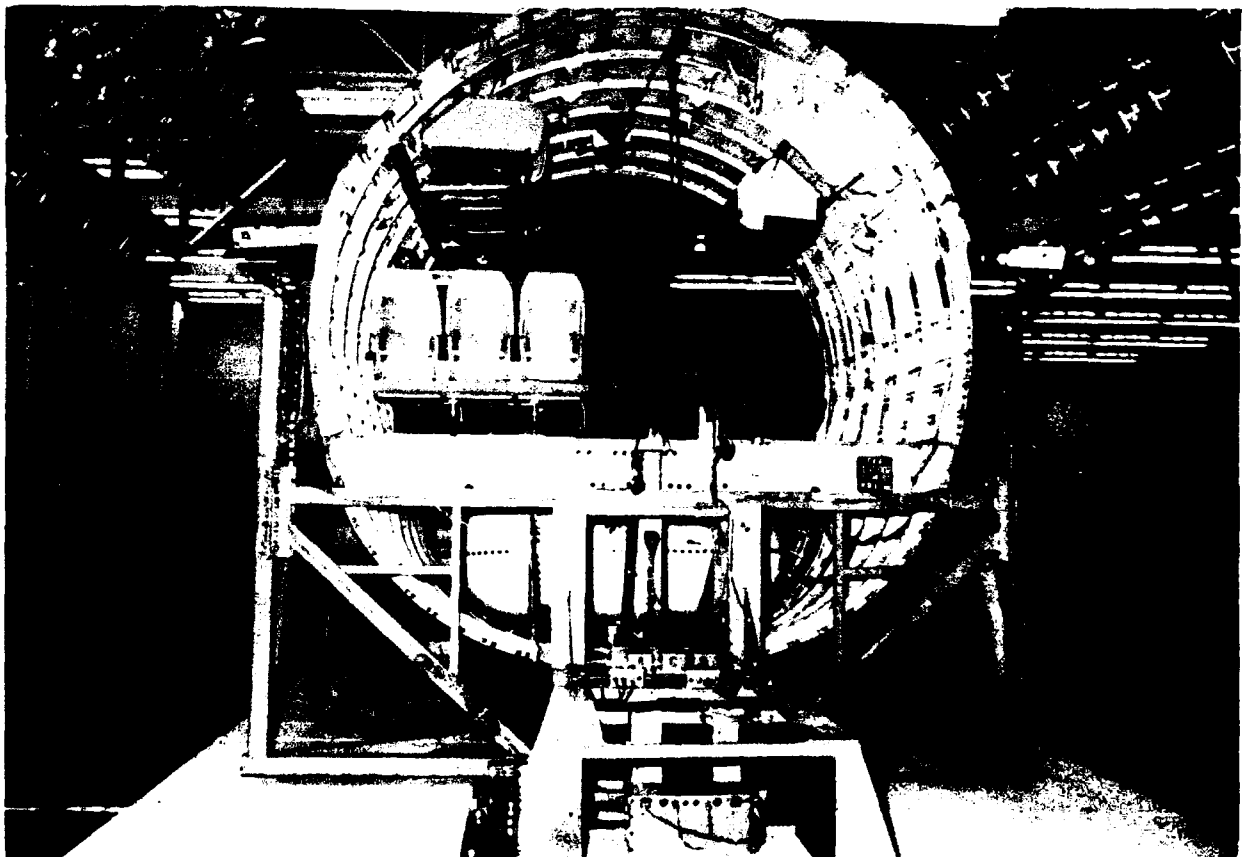


Figure 80. PRE-TEST OVERALL REAR VIEW



Figure 81. PRE-TEST BIN 'B' OVERALL SIDE VIEW

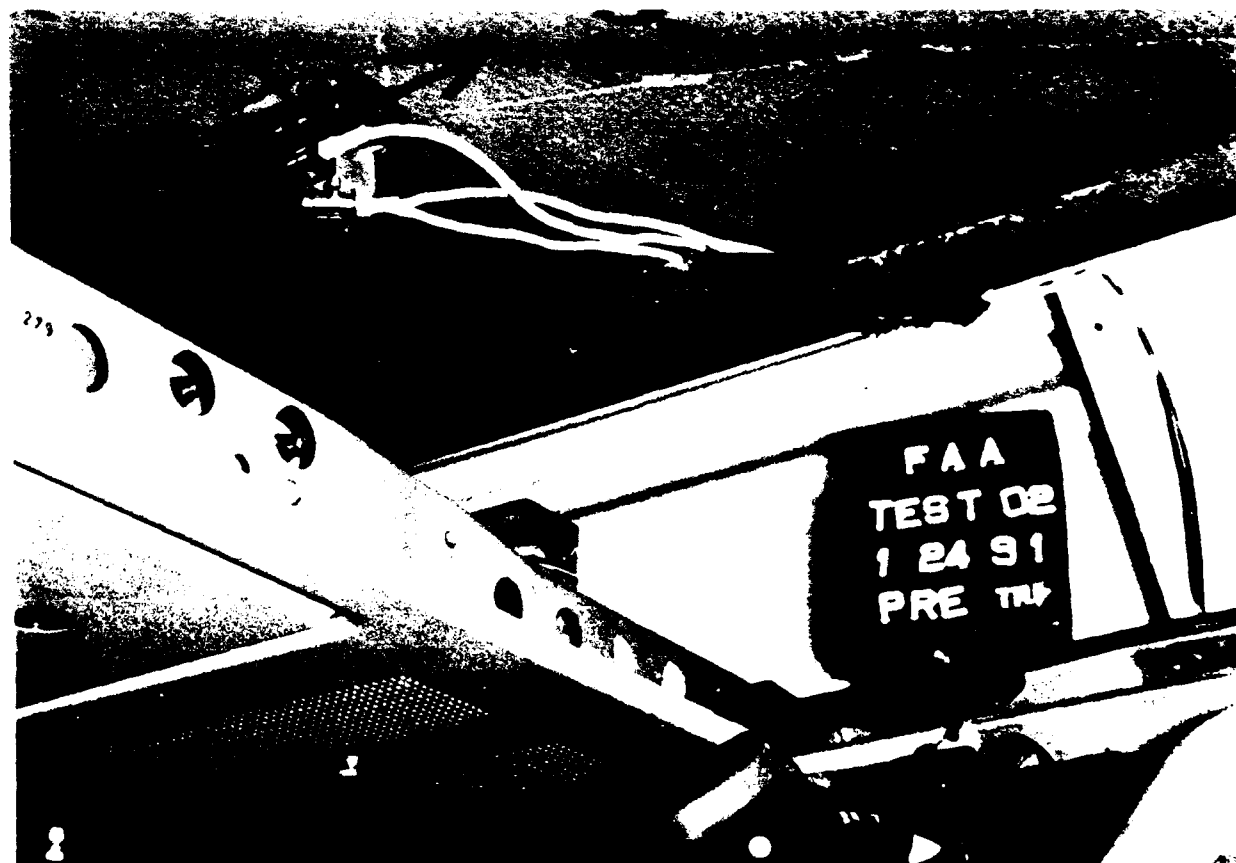


Figure 82. PRE-TEST BIN 'B' ACCELEROMETER POSITION

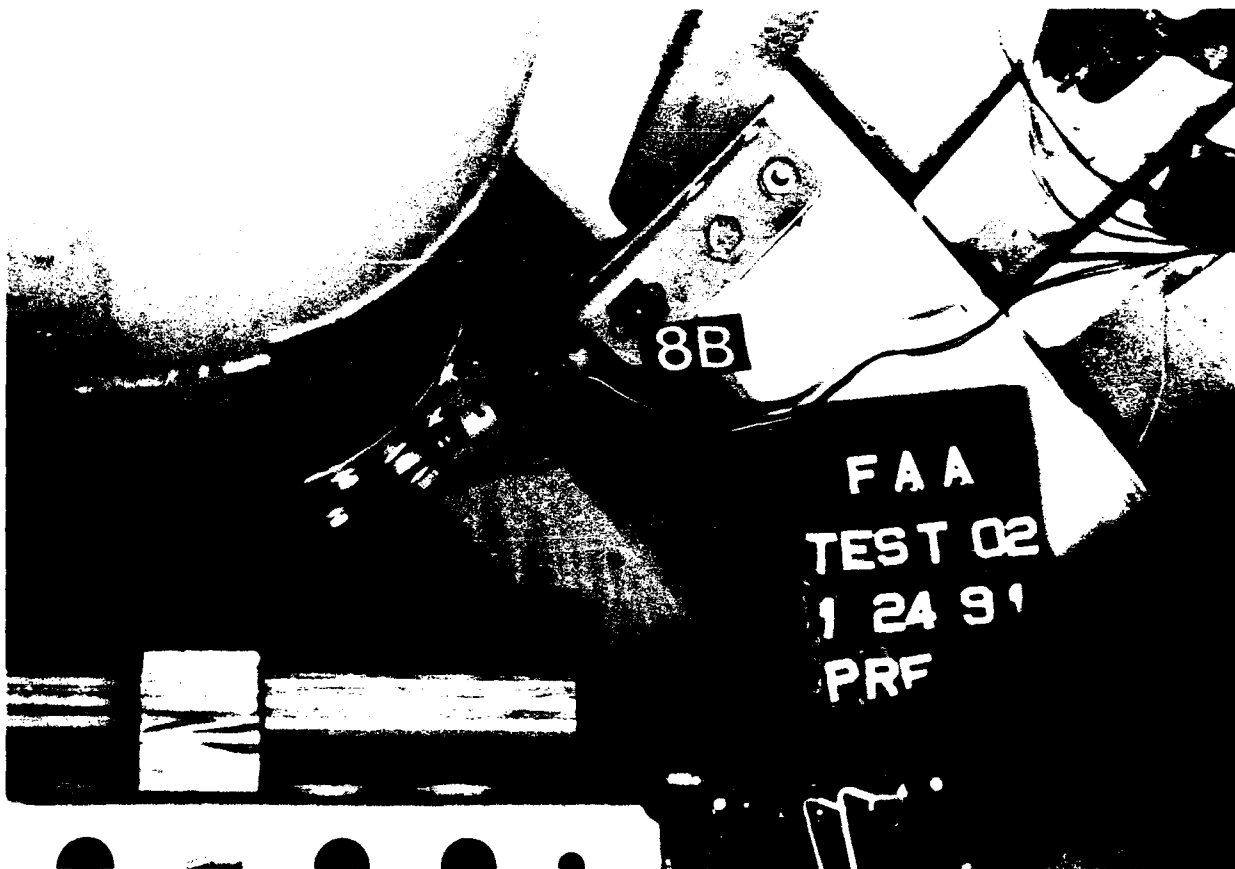


Figure 83. PRE-TEST BIN 'B' LINK 8

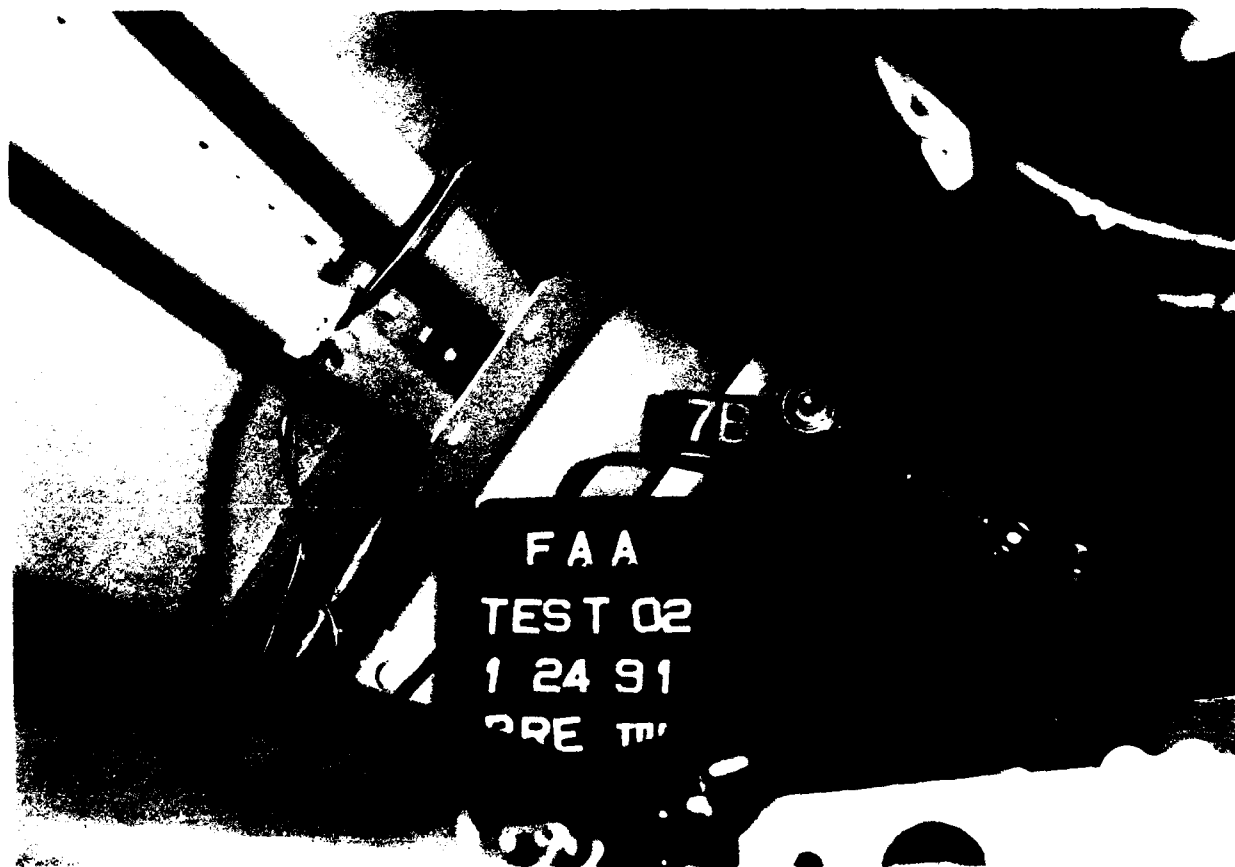


Figure 84. PRE-TEST BIN 'B' LINK

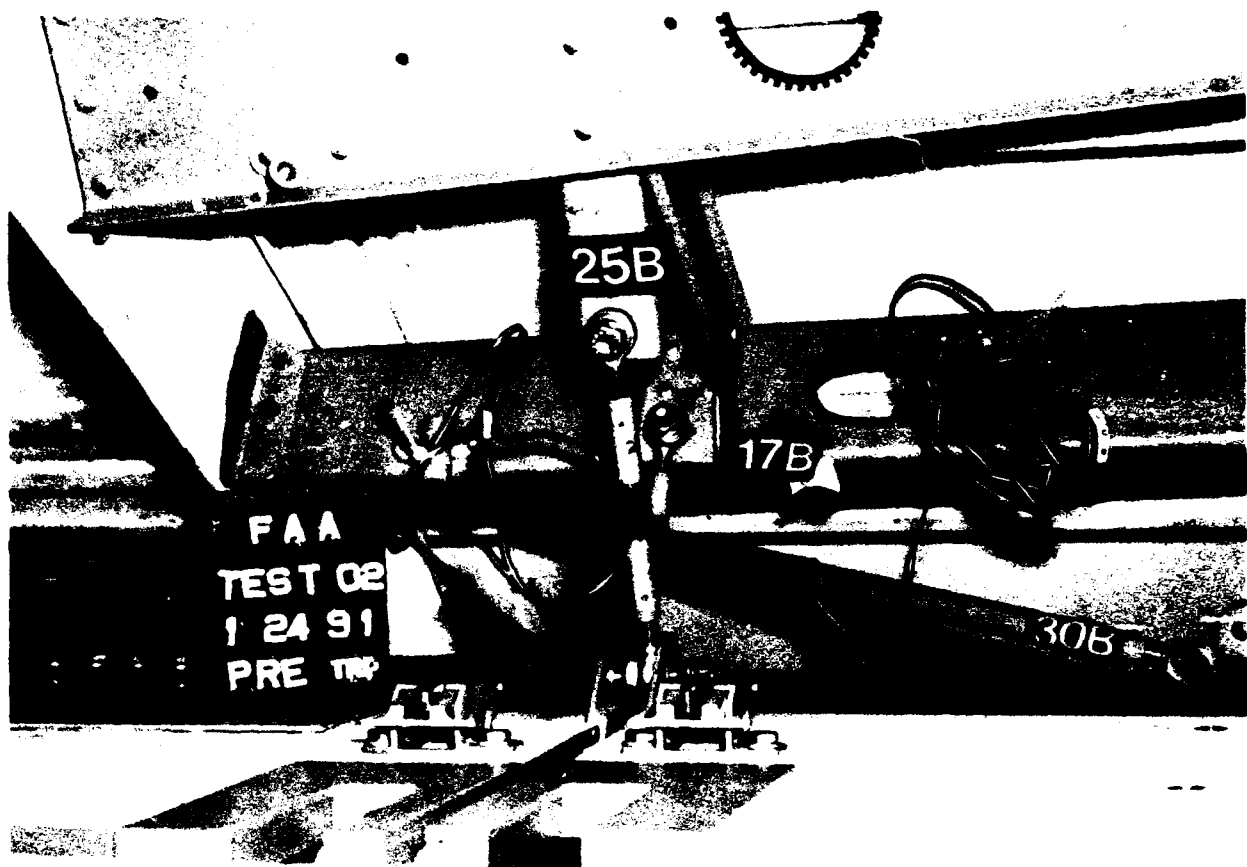


Figure 85. PRE-TEST BIN 'B' LINKS 17 AND 25

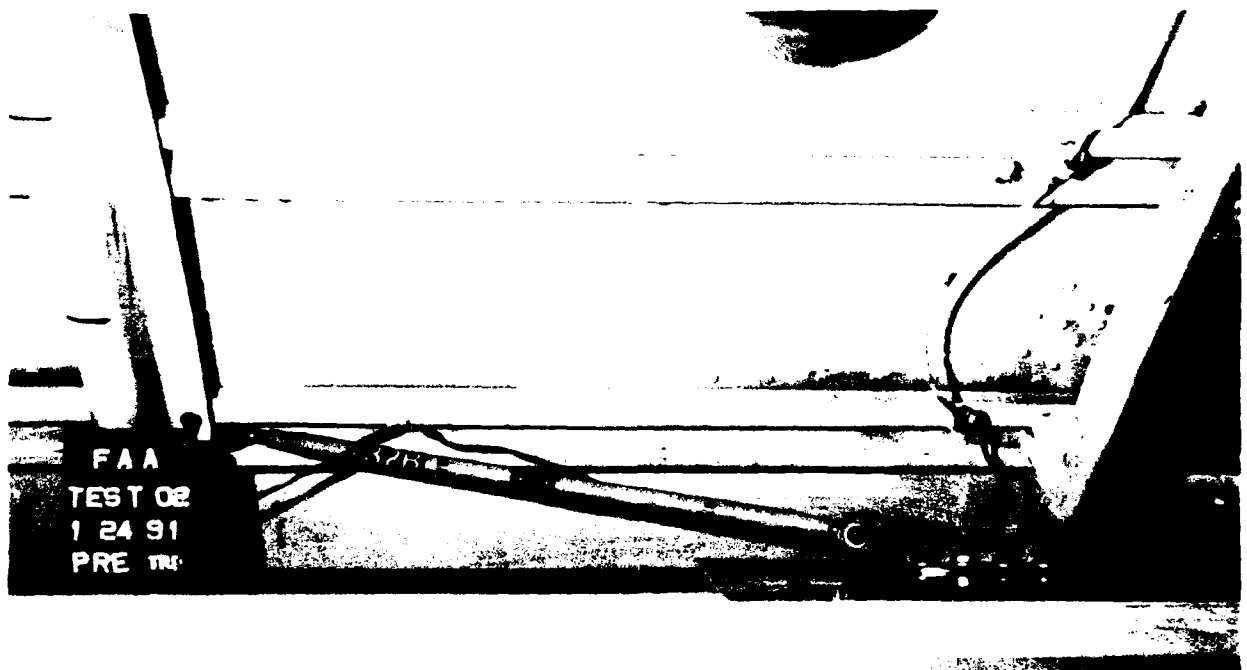


Fig. 86. PRE TEST BIN 'B' LINK 32 AND BIN MOUNT EXTERIOR REINFORCEMENT PLATE

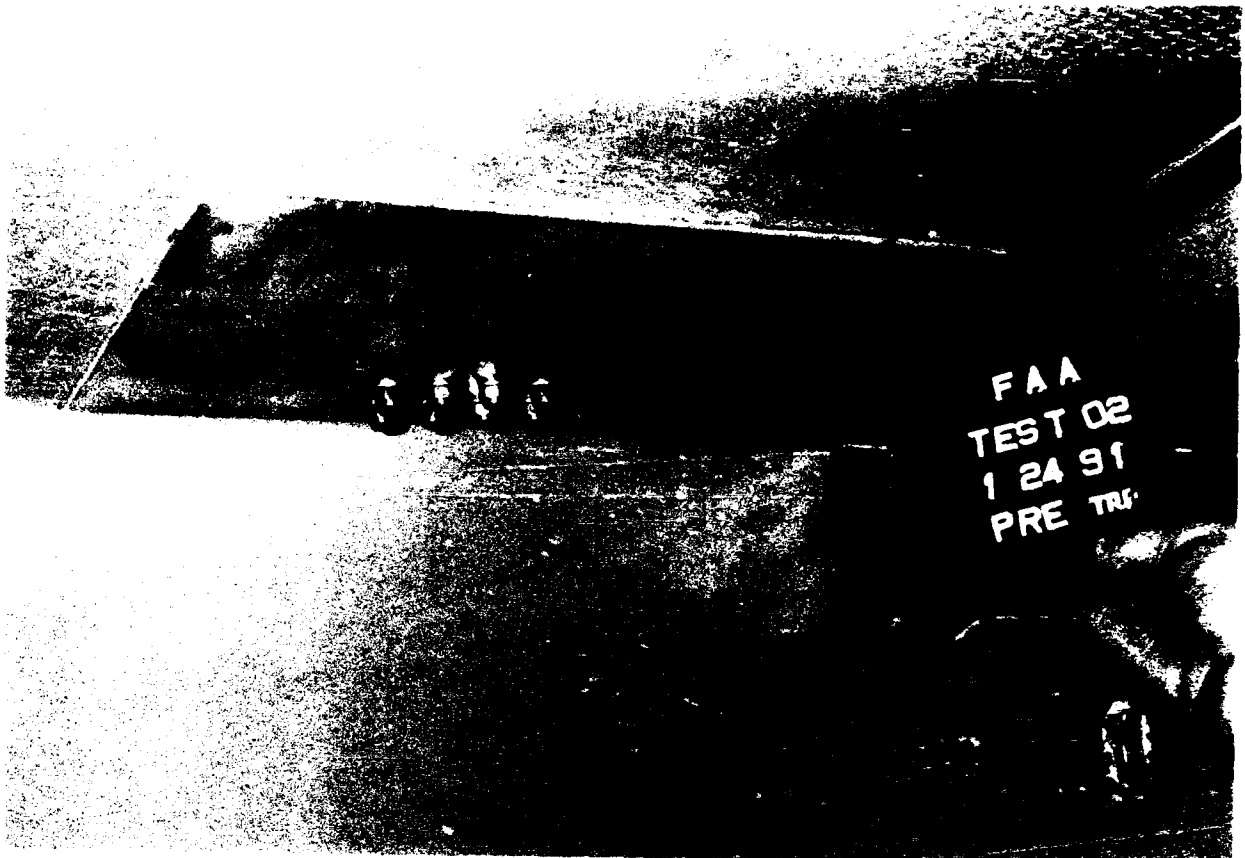


Figure 87. PRE-TEST BIN 'B' 60" BIN DRAG LINK MOUNT INTERIOR REINFORCEMENT PLATE

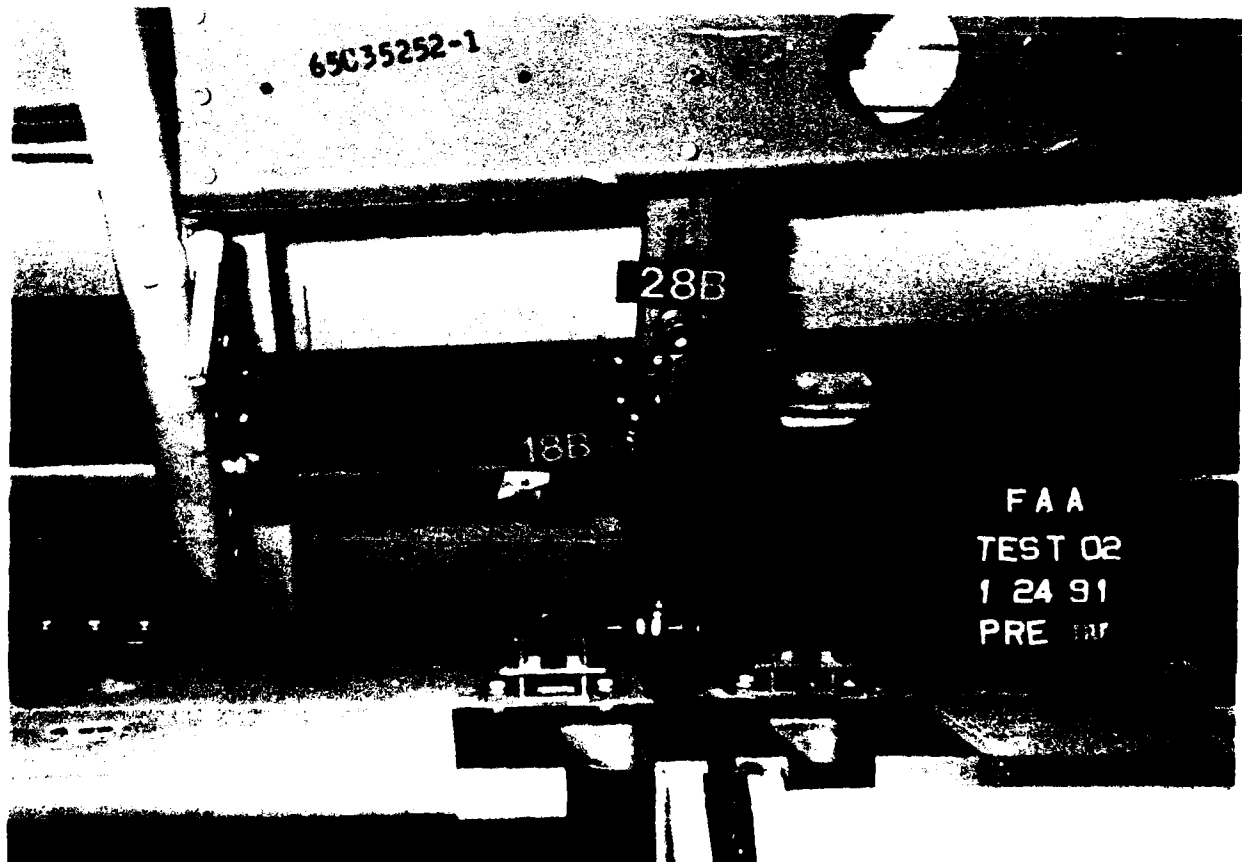


Figure 88. PRE TEST BIN 'B' LINKS 18 AND 28

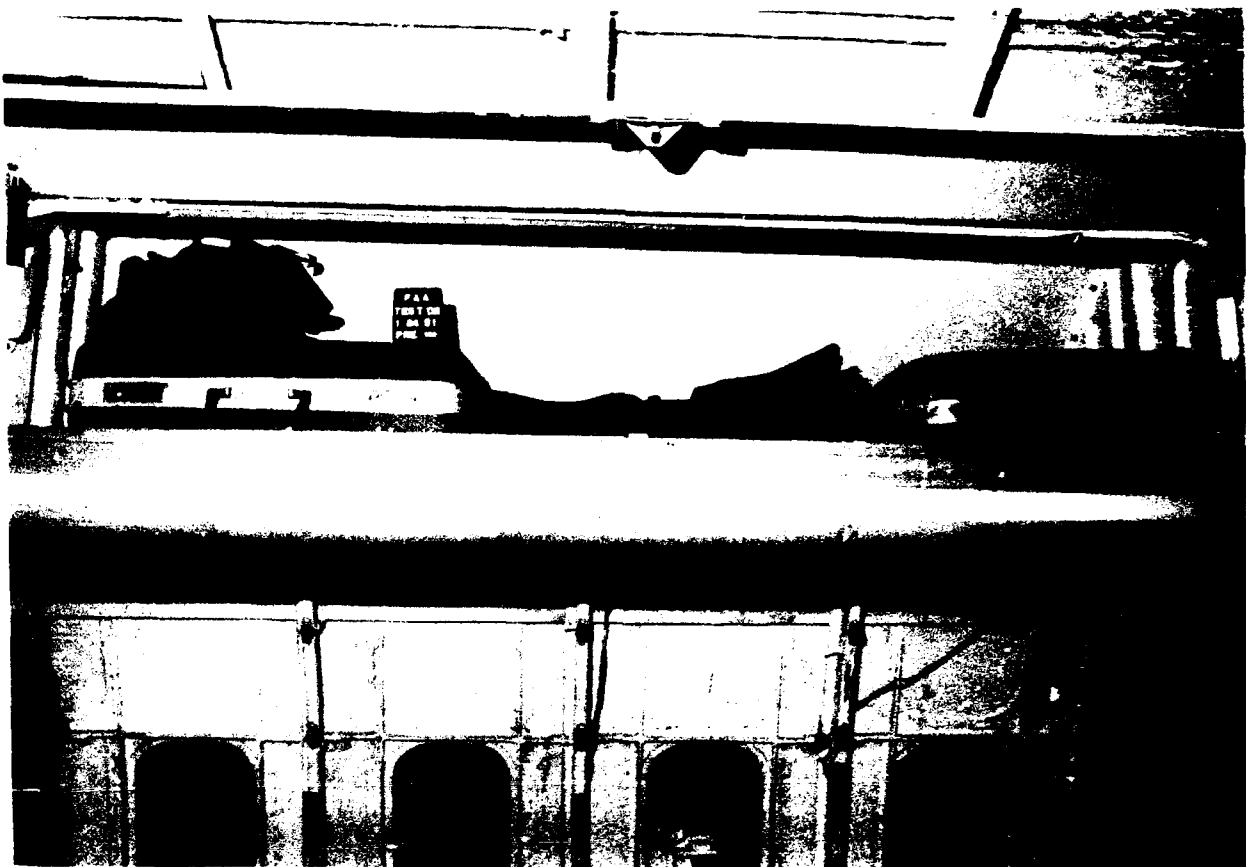


Figure 83. PRE TEST BIN 'A' BALLAST POSITION

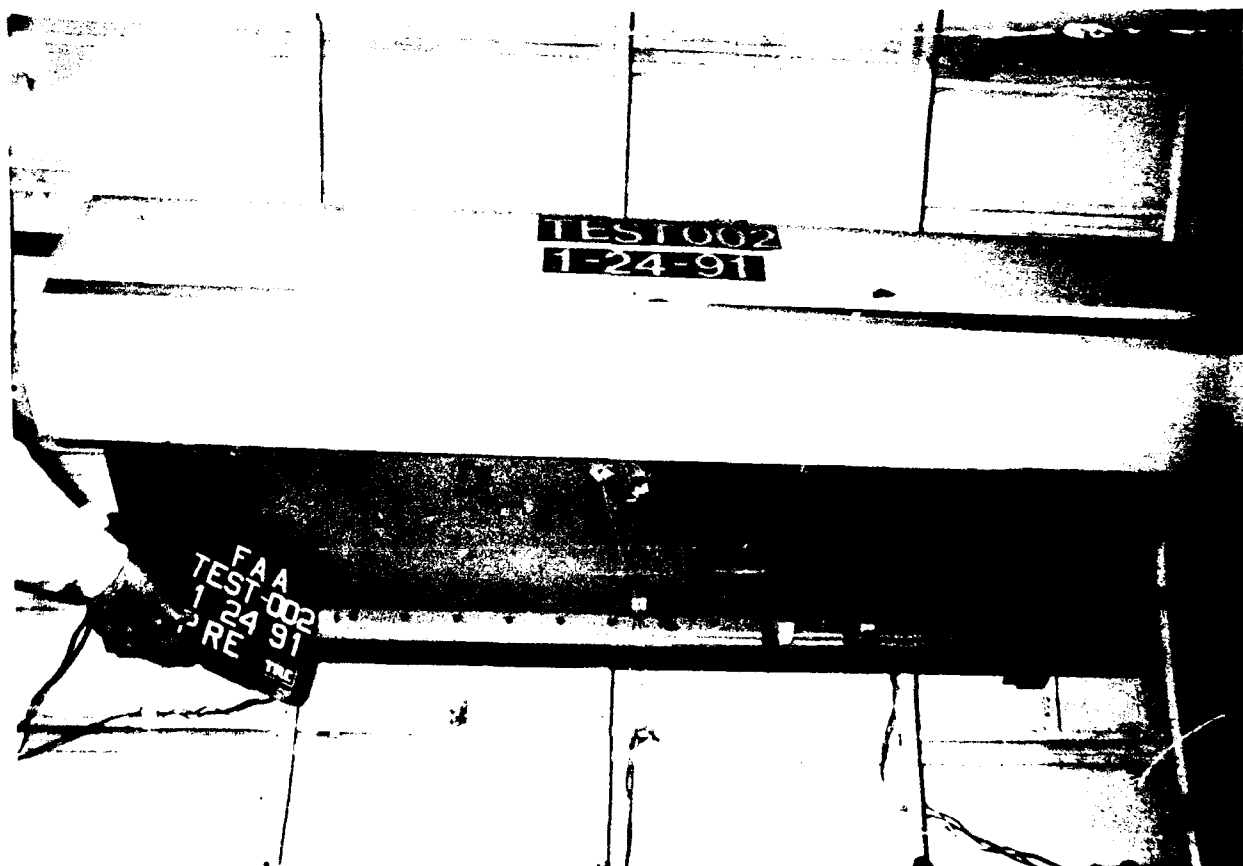


Figure 84. PRE TEST BIN 'A' BALLAST POSITION

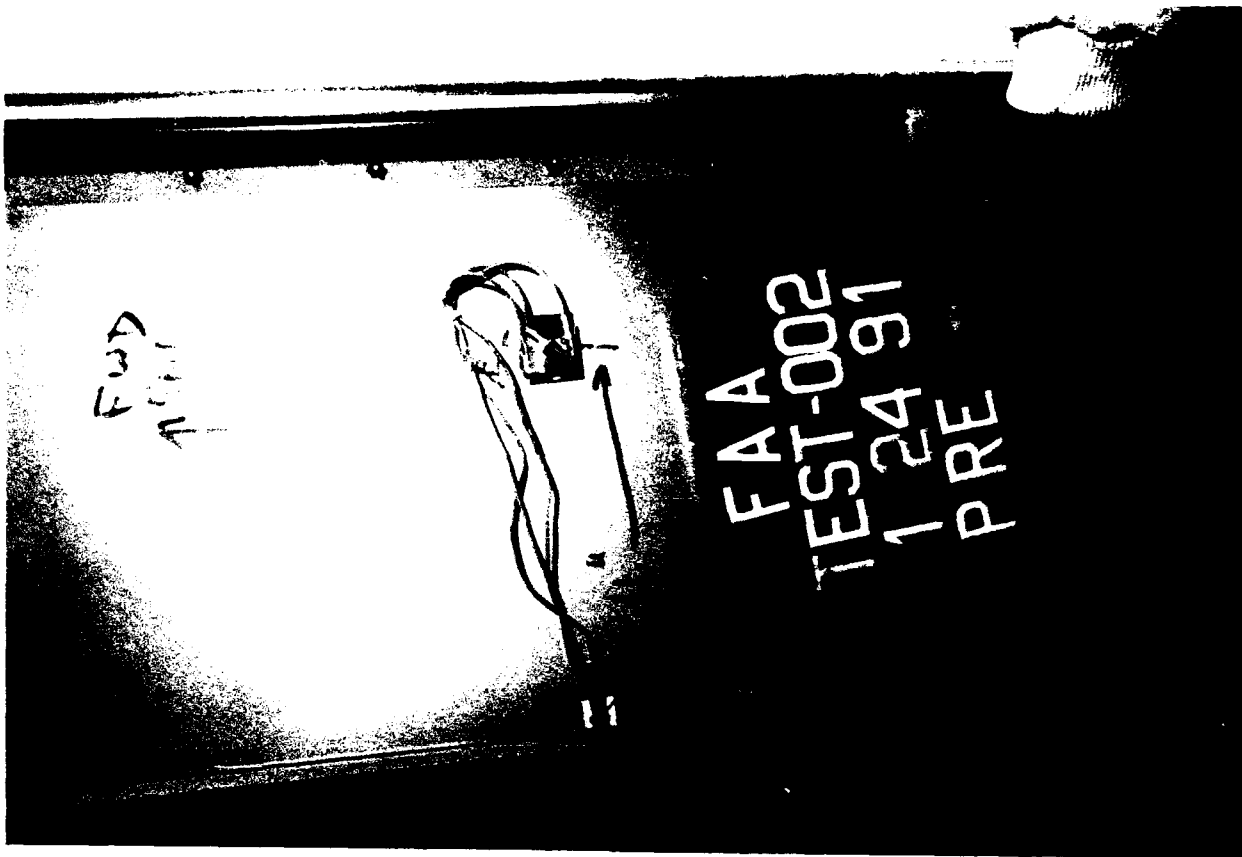


Figure 91. PRE-TEST BIN 'A' ACCELEROMETER POSITION



Figure 92. PRE-TEST BIN 'A' FORWARD, 45° DOWN, 45° LEFT, FRONT ANGLE VIEW

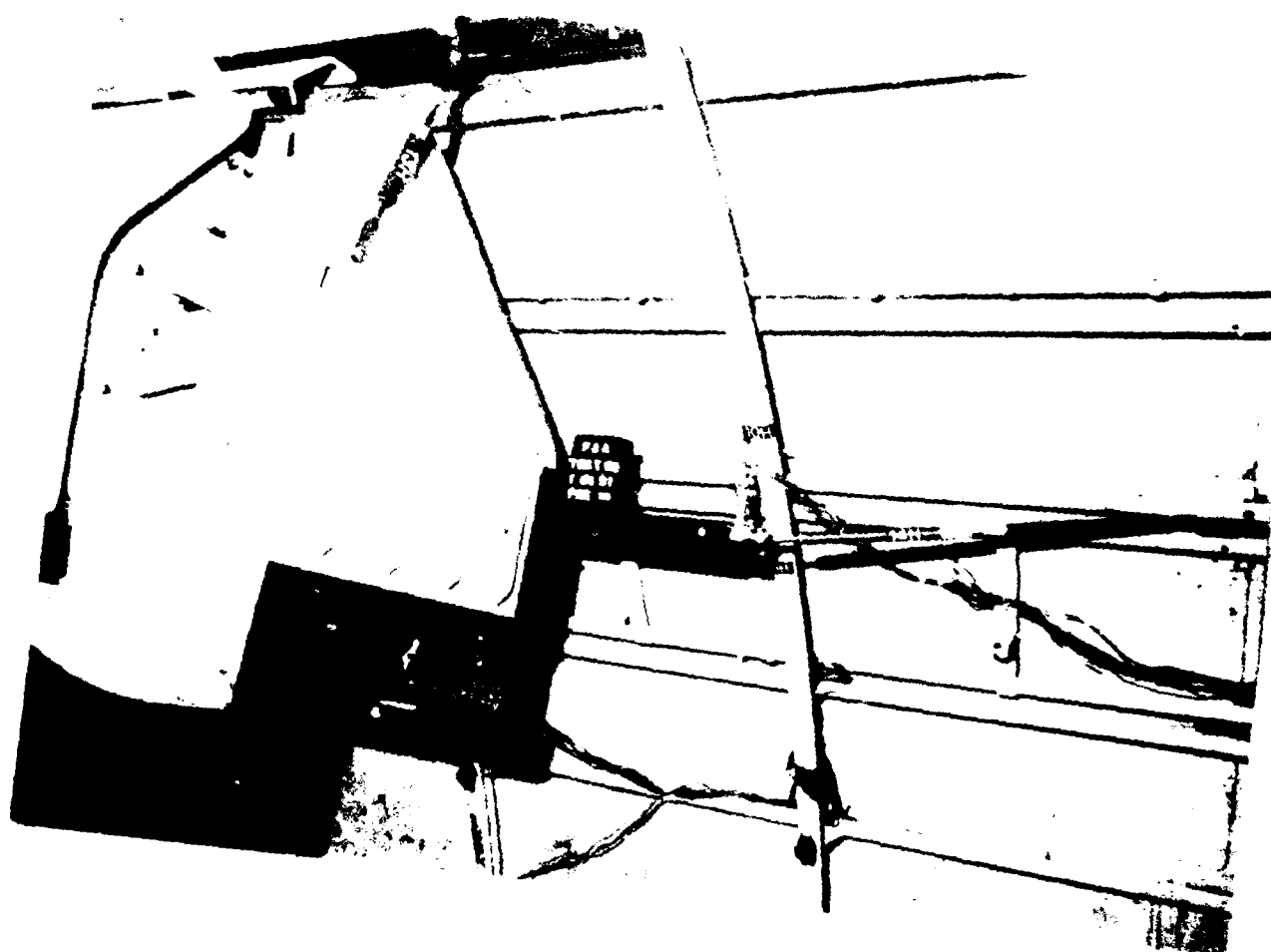
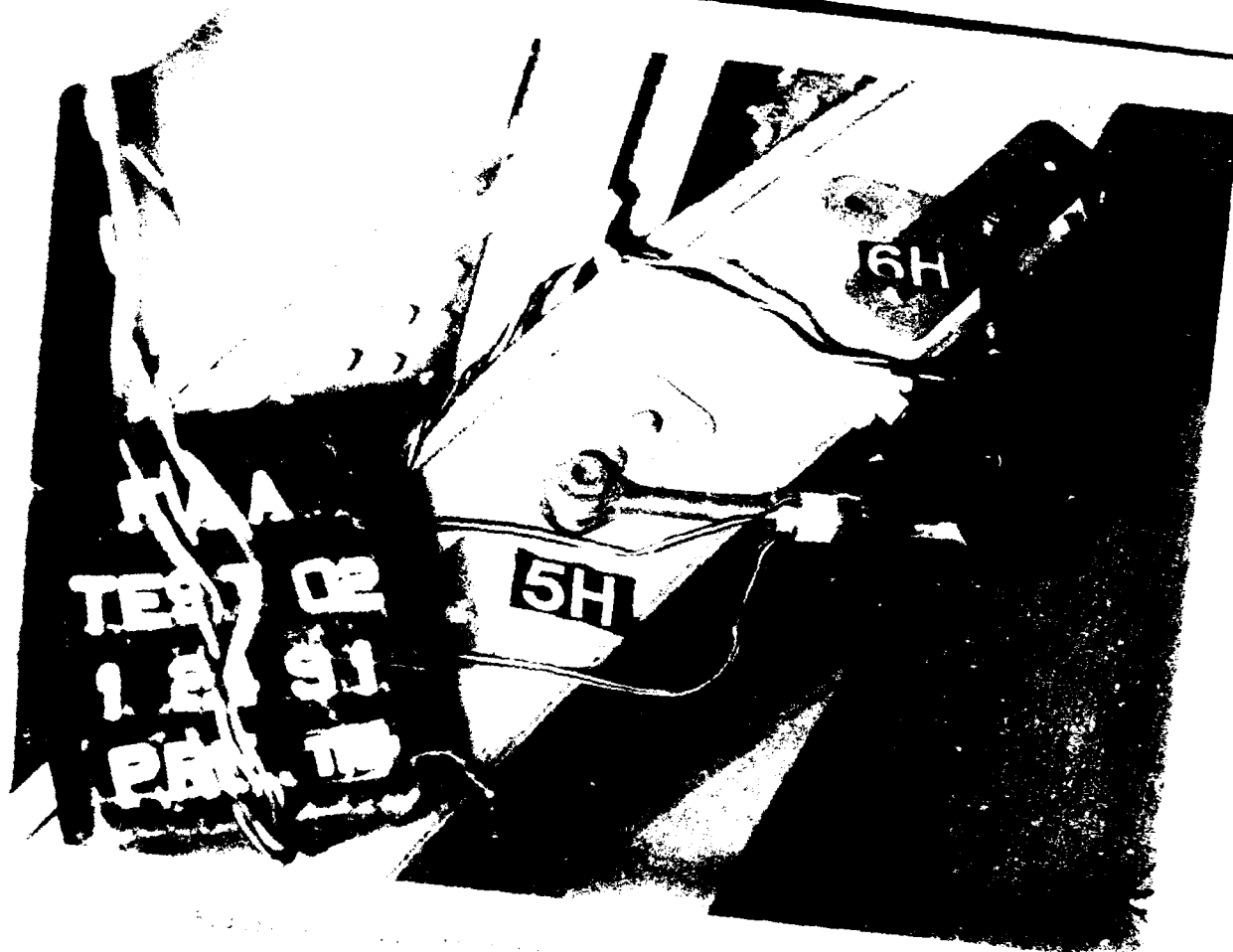




Figure 95. PRE-TEST BIN 'A' LINKS 9, 10, AND 14



Figure 96. POST-TEST BIN 'A' LINKS 9, 10, AND 14

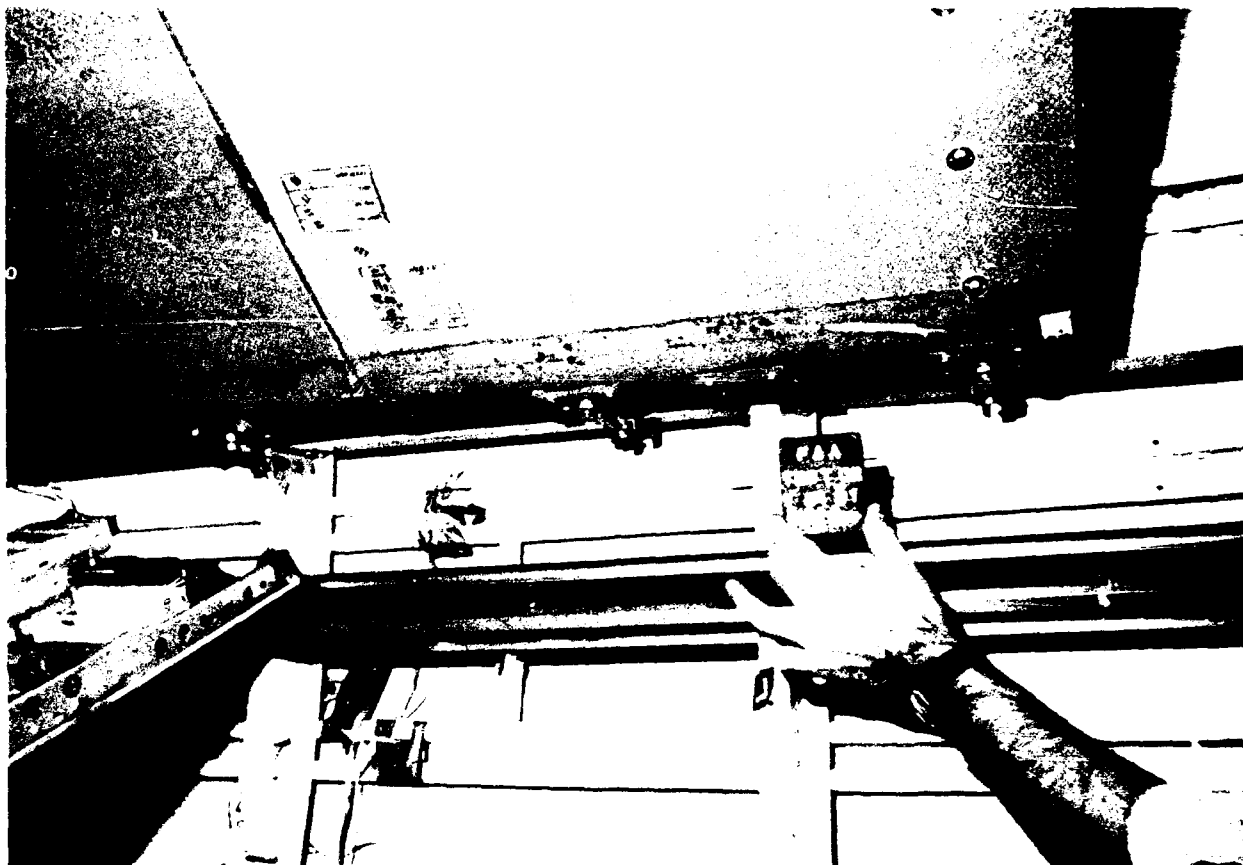


FIGURE 47. BOLT TEST BIN (B) FORWARD LOWER RAILROAD TUNNEL





Figure 99. POST-TEST BIN 'B' LINKS 17 AND 25



Figure 100. POST TEST BIN 'B' LINK 32



Figure 101. POST TEST BIN 'B' LINKS 18 AND 25

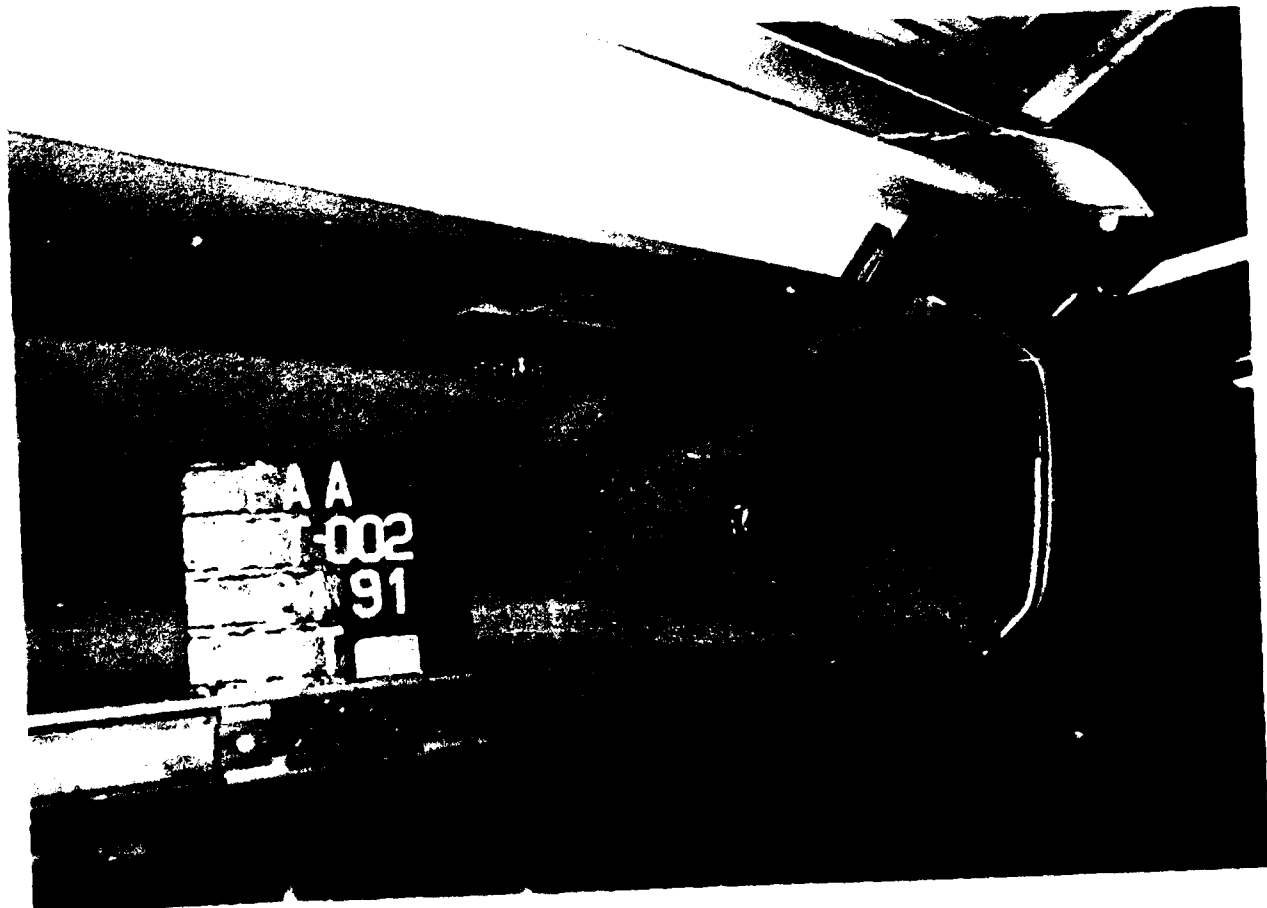


Figure 102. POST TEST BIN 'B' 60" BIN INTERIOR



Figure 103. POST-TEST BIN 'B' 60" BIN FORWARD PANEL INTERIOR

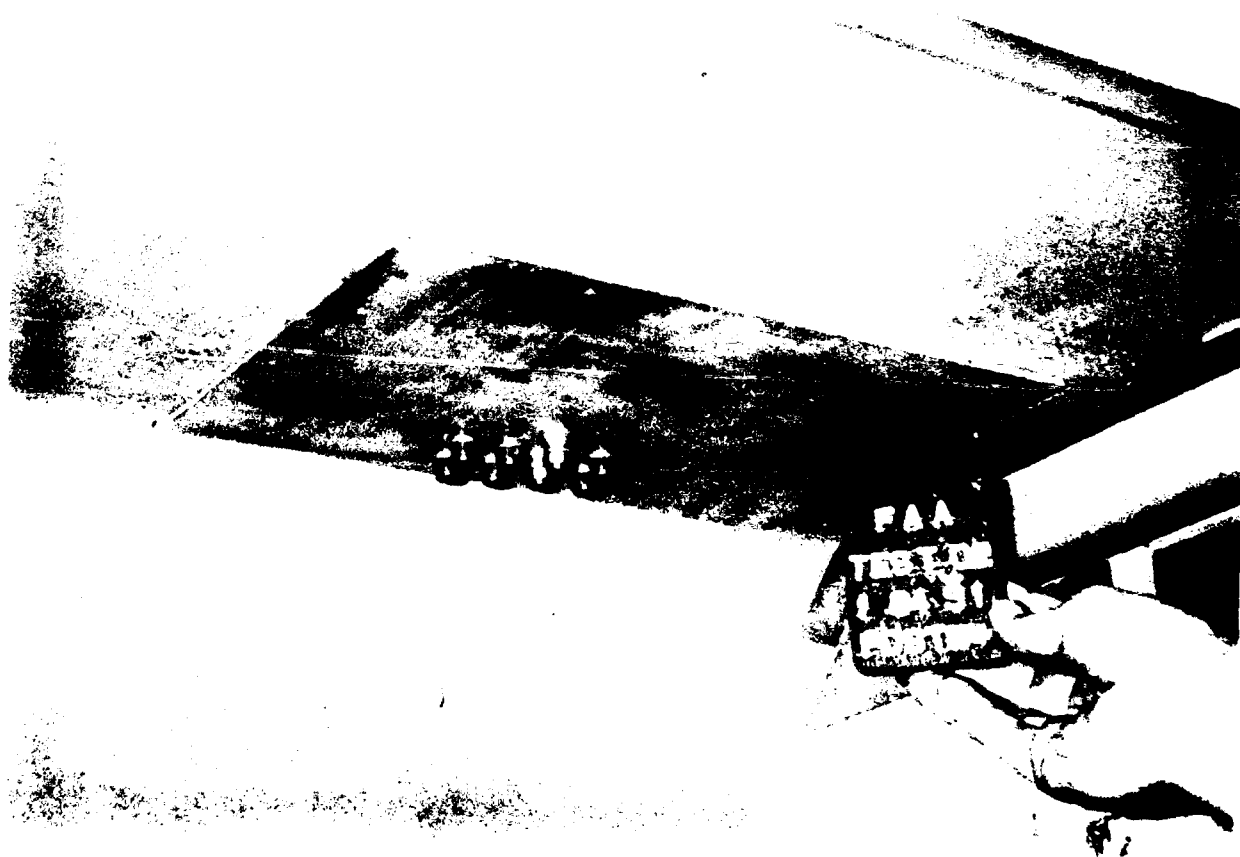


Figure 104 POST TEST BIN 'B' 60" BIN FORWARD PANEL INTERIOR
REFINE ELEMENT PLATE



FIGURE 10 POST TEST BIN 'A' OVERALL REAR ANGLE VIEW

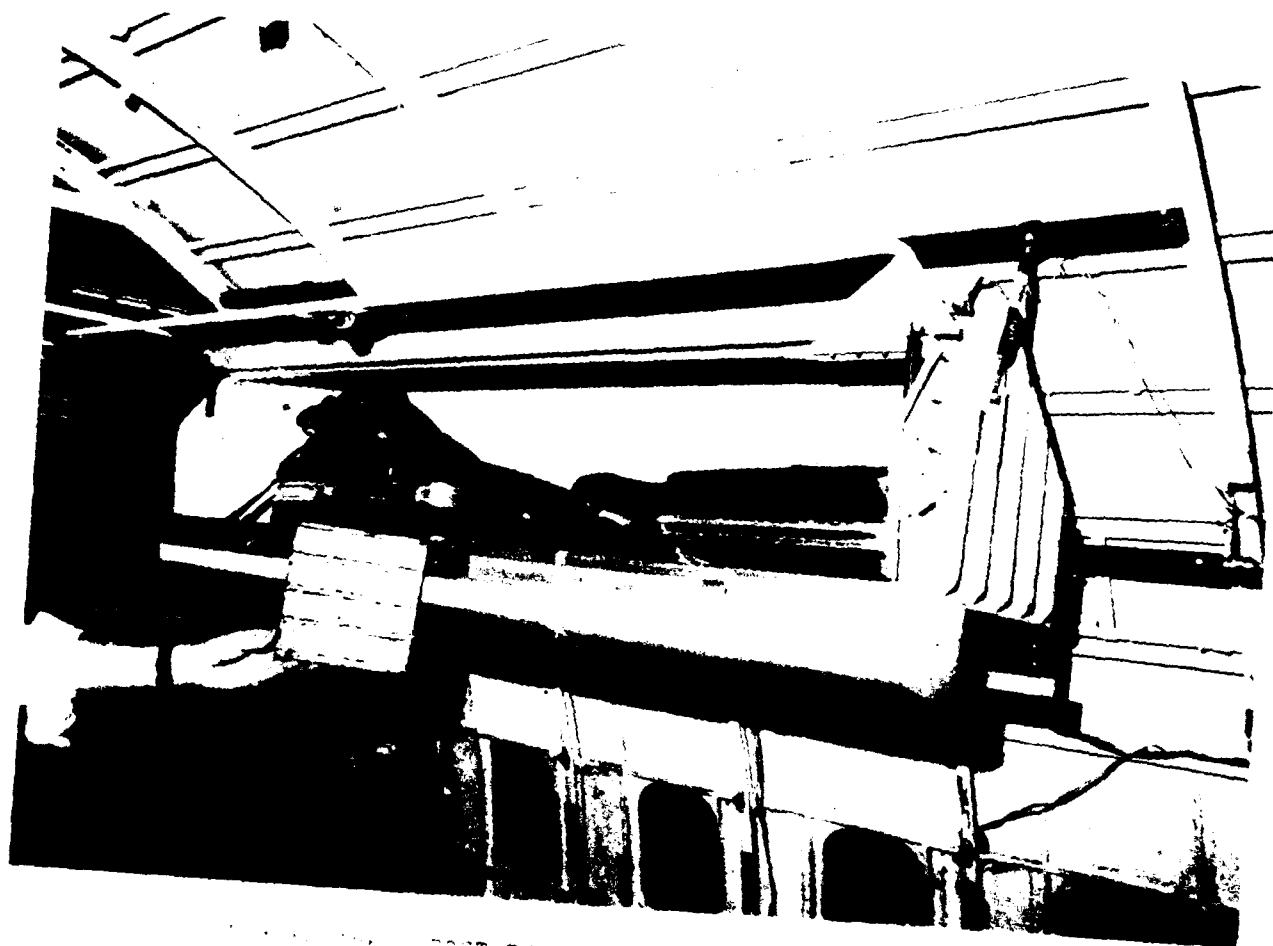


FIGURE 11 POST TEST BIN 'A' BALLAST POSITION



Figure 107. POST-TEST BIN 'A' FORWARD PANEL INTERIOR

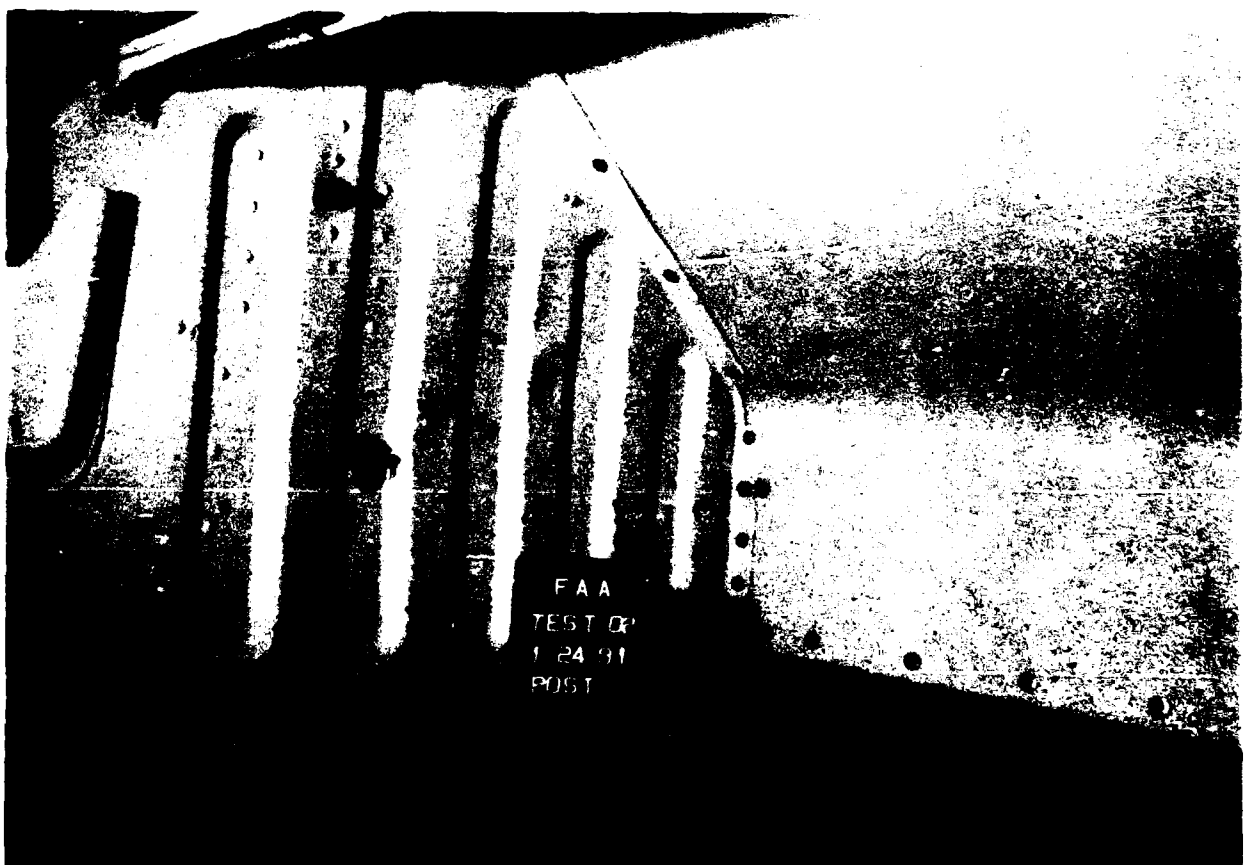


Figure 108. POST-TEST BIN 'A' FORWARD PANEL REAR VIEW



Figure 109. POST TEST BIN 'A' FORWARD STRUCTURE SIDE VIEW

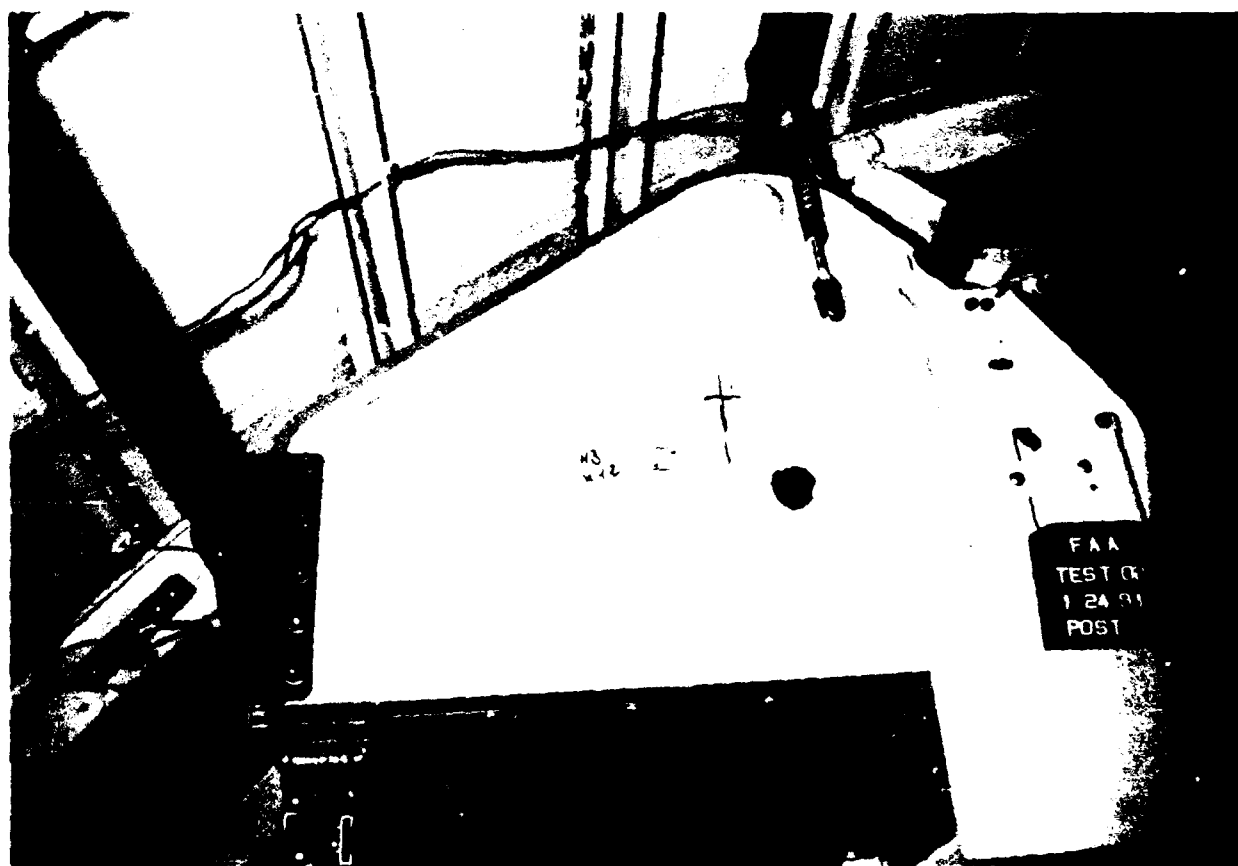


Figure 110. POST TEST BIN 'A' FORWARD PANEL FRONT VIEW

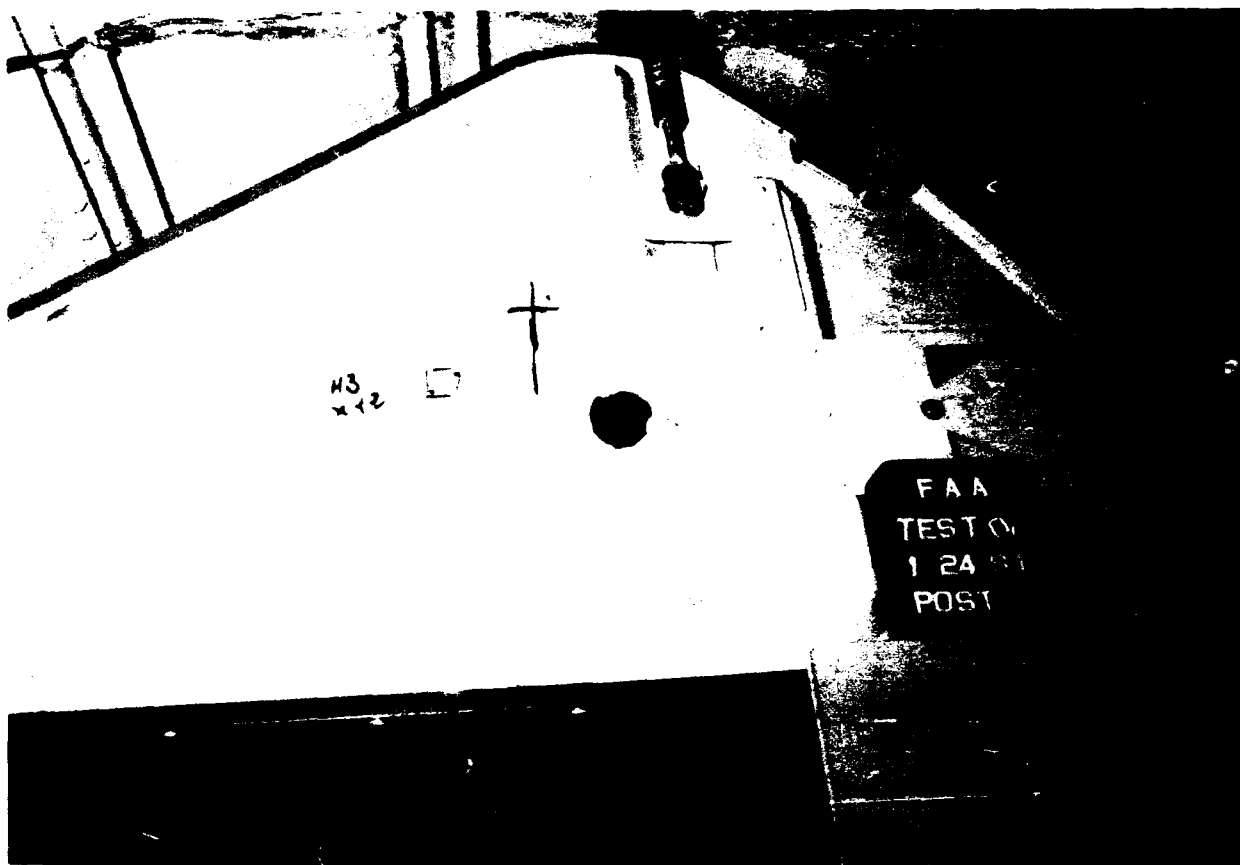


Figure 111. POST-TEST BIN 'A' FORWARD PANEL FRONT INBOARD 3/4 VIEW

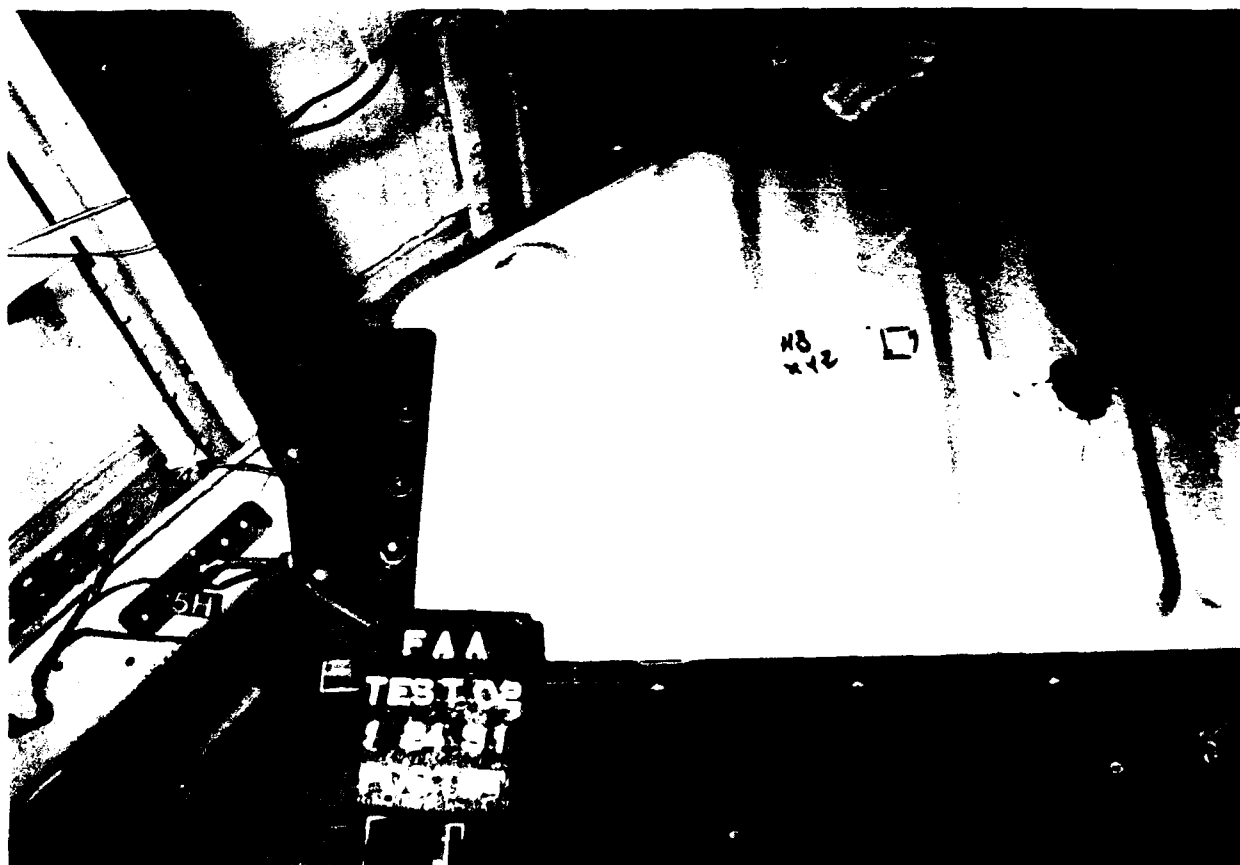


Figure 112. POST TEST BIN 'A' FORWARD PANEL FRONT OUTBOARD 3/4 VIEW

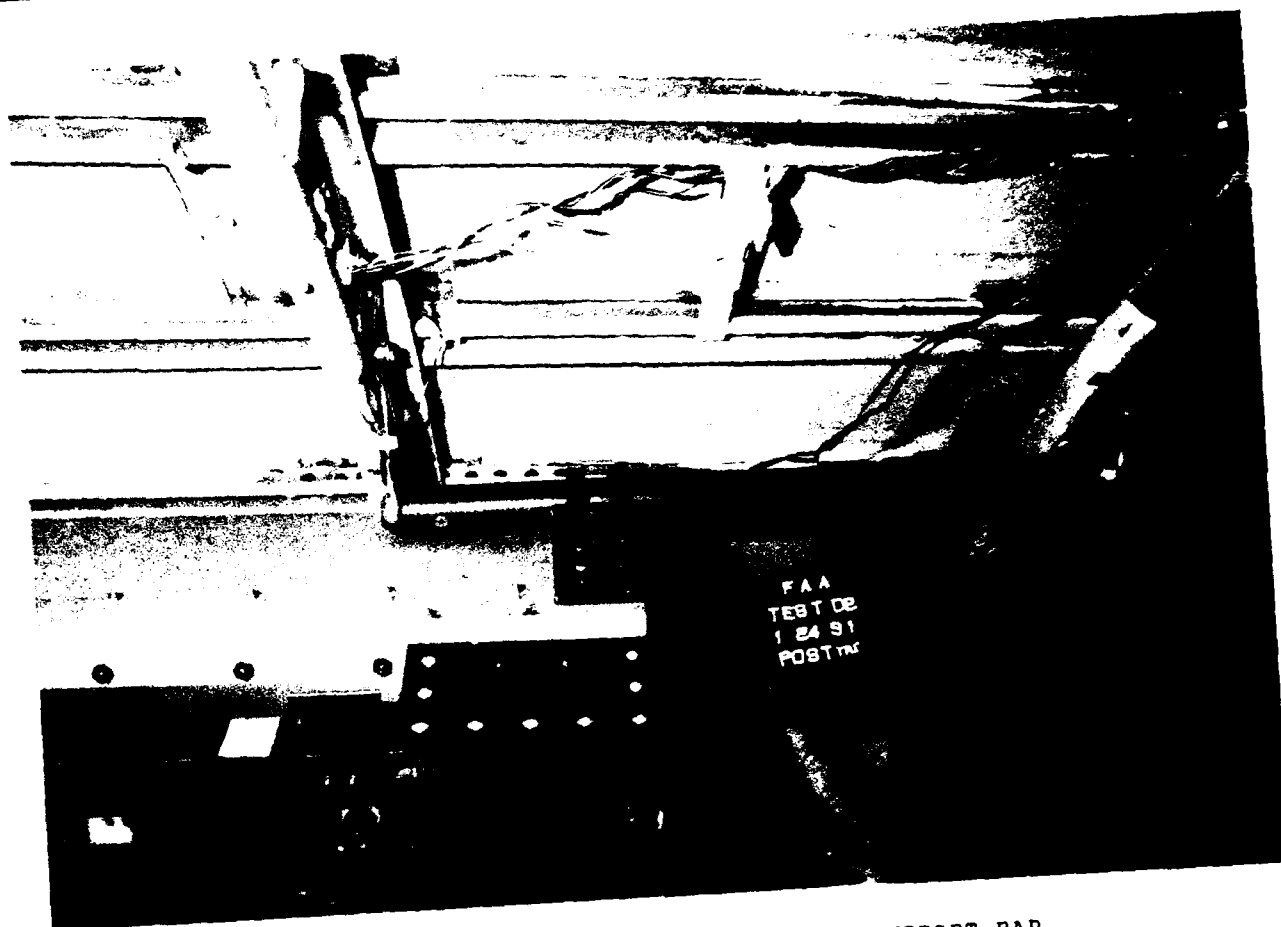


Figure 113. POST-TEST BIN 'A' FRONT SUPPORT BAR



Figure 114. POST-TEST BIN 'A' REAR STRUCTURE REAR ANGLE VIEW



Figure 115. POST-TEST BIN 'A' REAR SUPPORT BAR



Figure 116. POST TEST SEATS AND DUMMIES FRONT ANGLE VIEW

TEST 003

(FIGURES 117 THROUGH 165)

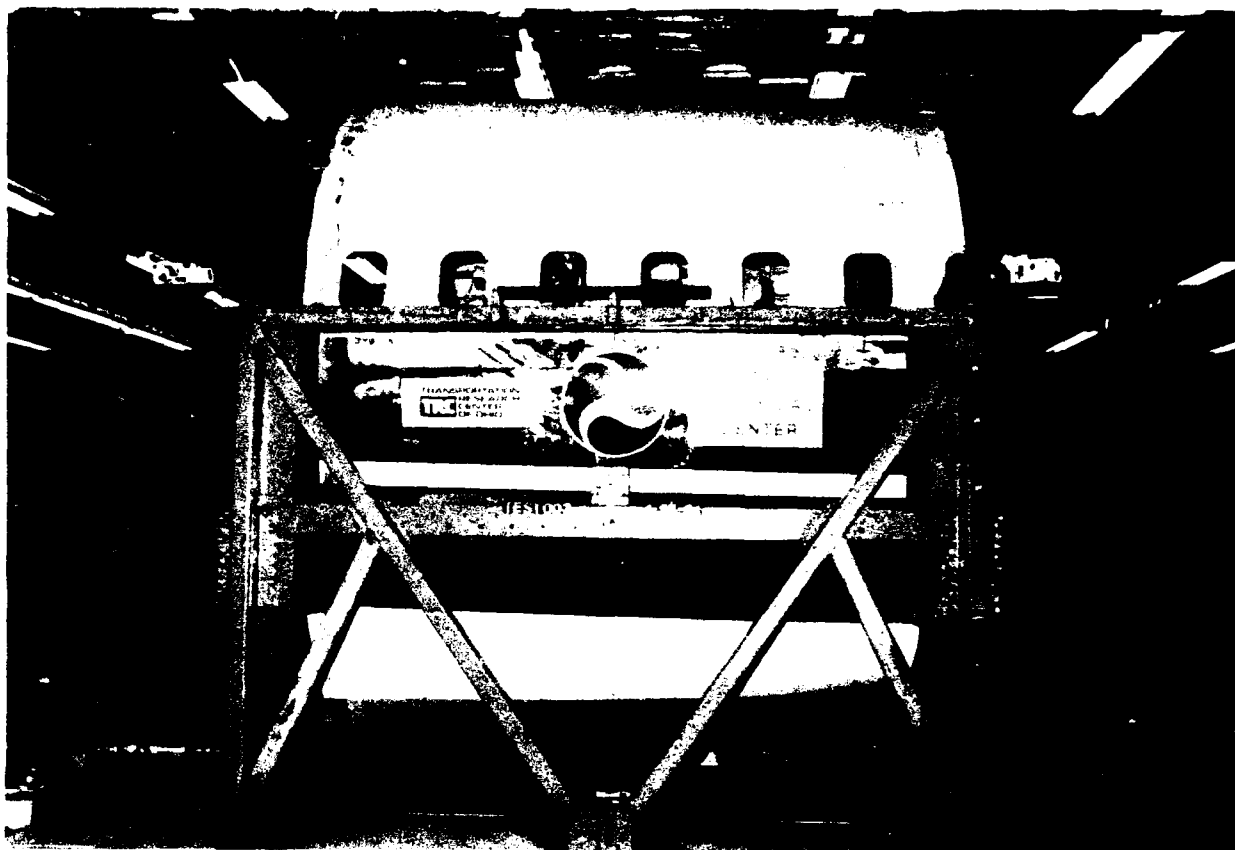


Figure 117. PRE-TEST OVERALL LEFT SIDE VIEW

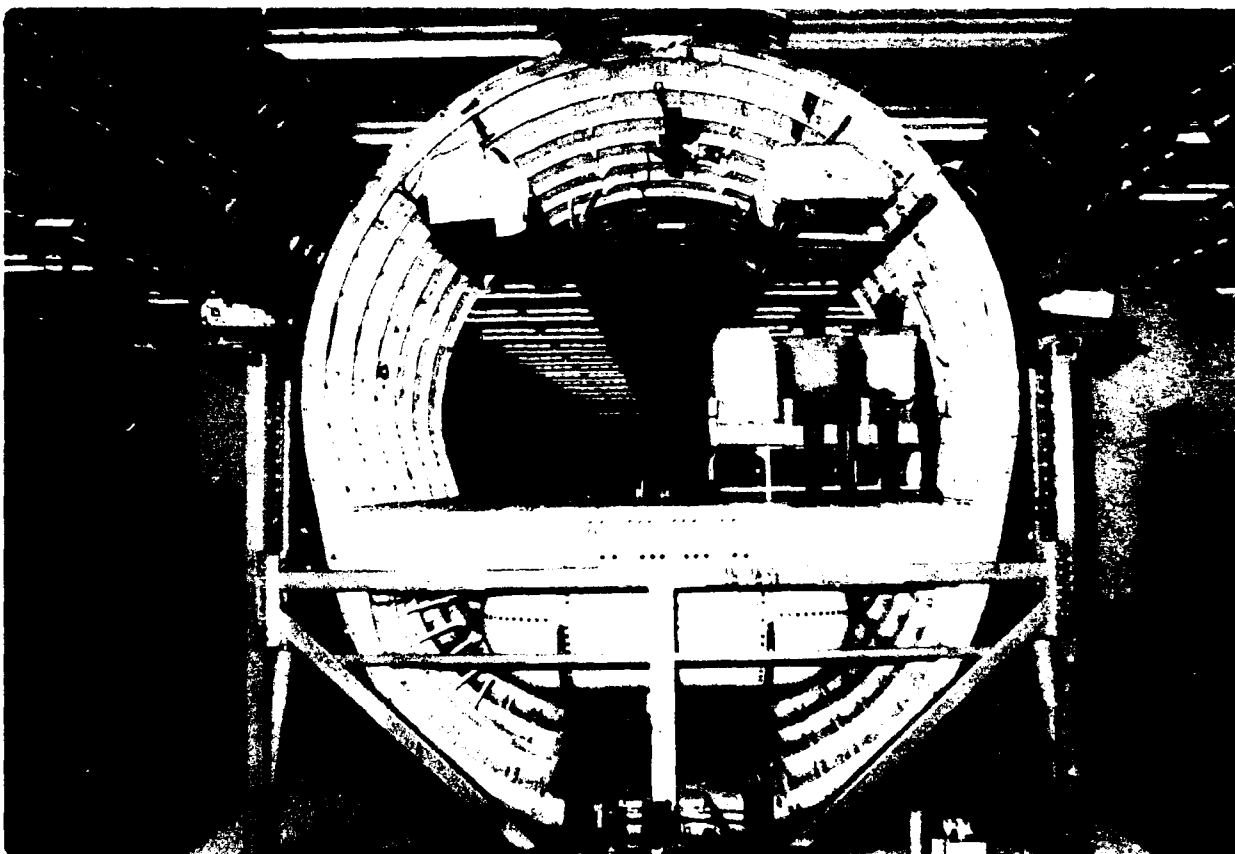


Figure 118. PRE TEST FRONT VIEW

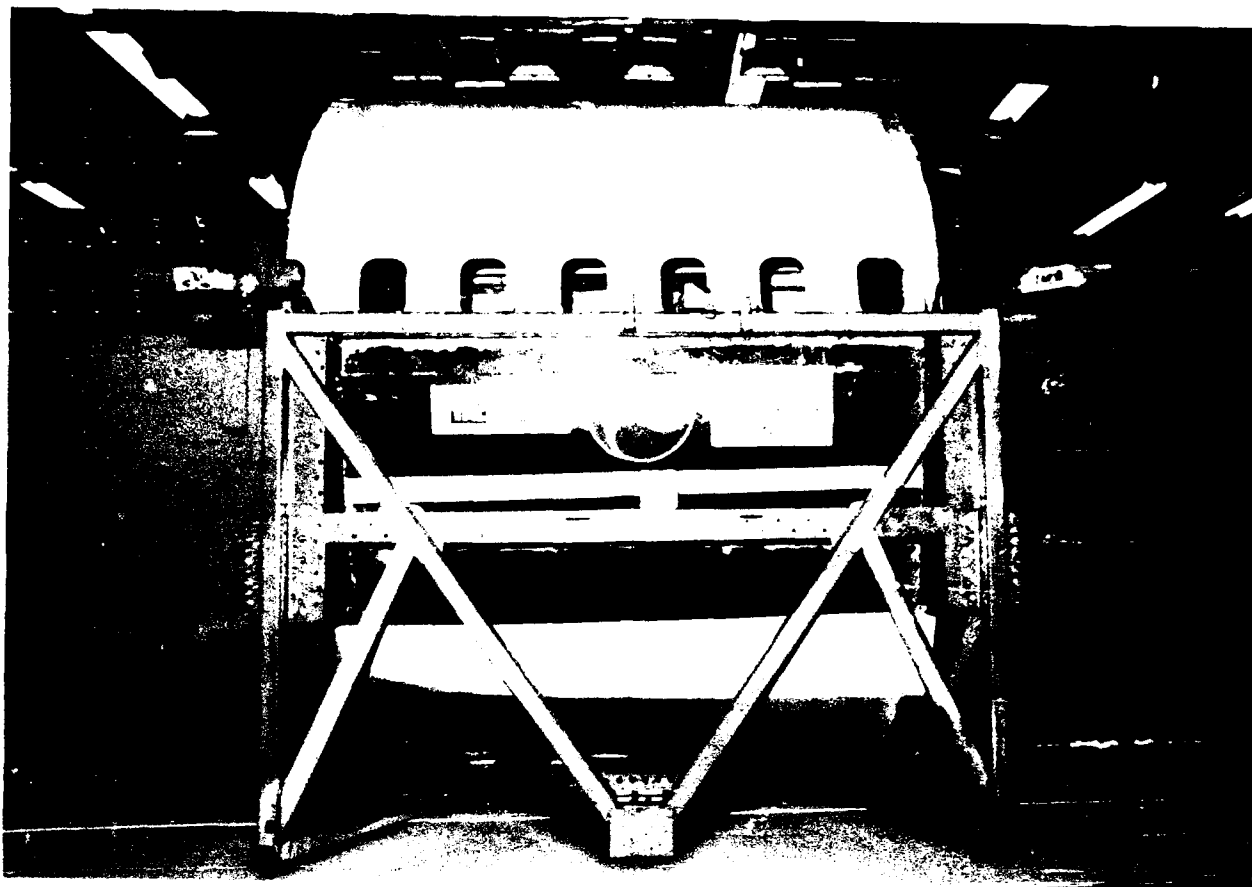


Figure 119. PRE-TEST OVERALL RIGHT SIDE VIEW

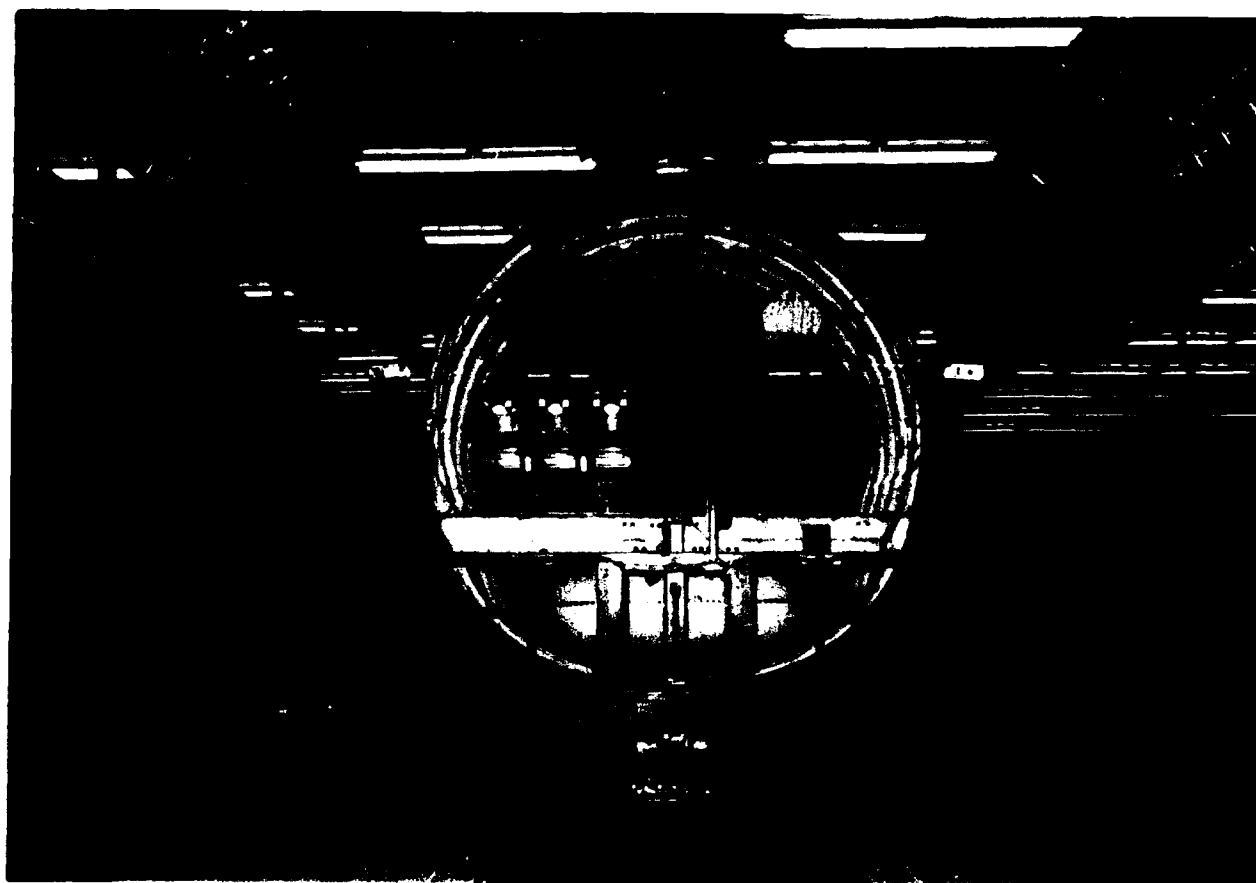


Figure 120. PRE TEST REAR VIEW



Figure 121. PRE-TEST BIN 'B' LINK 30



Figure 122. PRE TEST BIN 'A' BALLAST POSITION



Figure 123. PRE-TEST BIN 'A' FOAM/WOOD LOAD DISTRIBUTORS

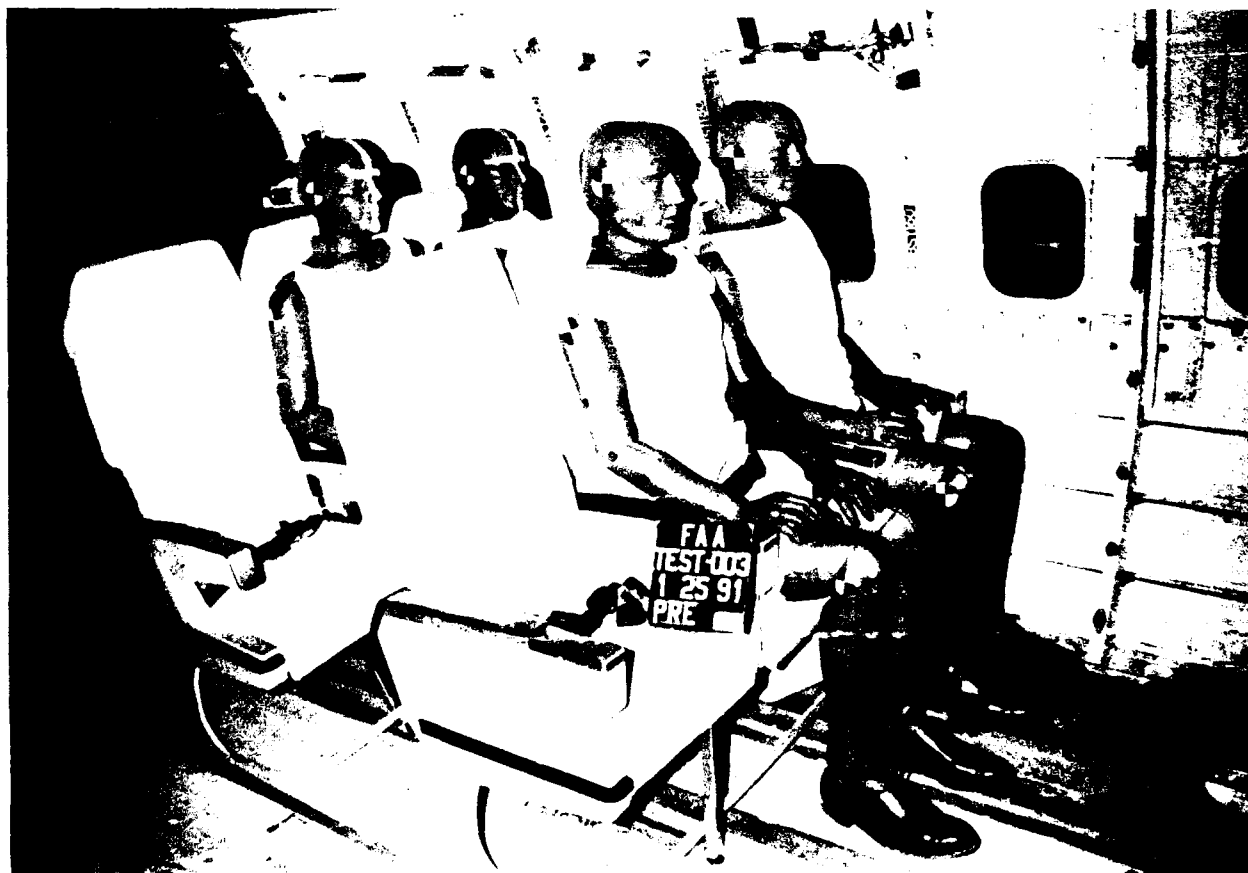


Figure 124. PRE-TEST SEATS AND DUMMIES FRONT ANGLE VIEW

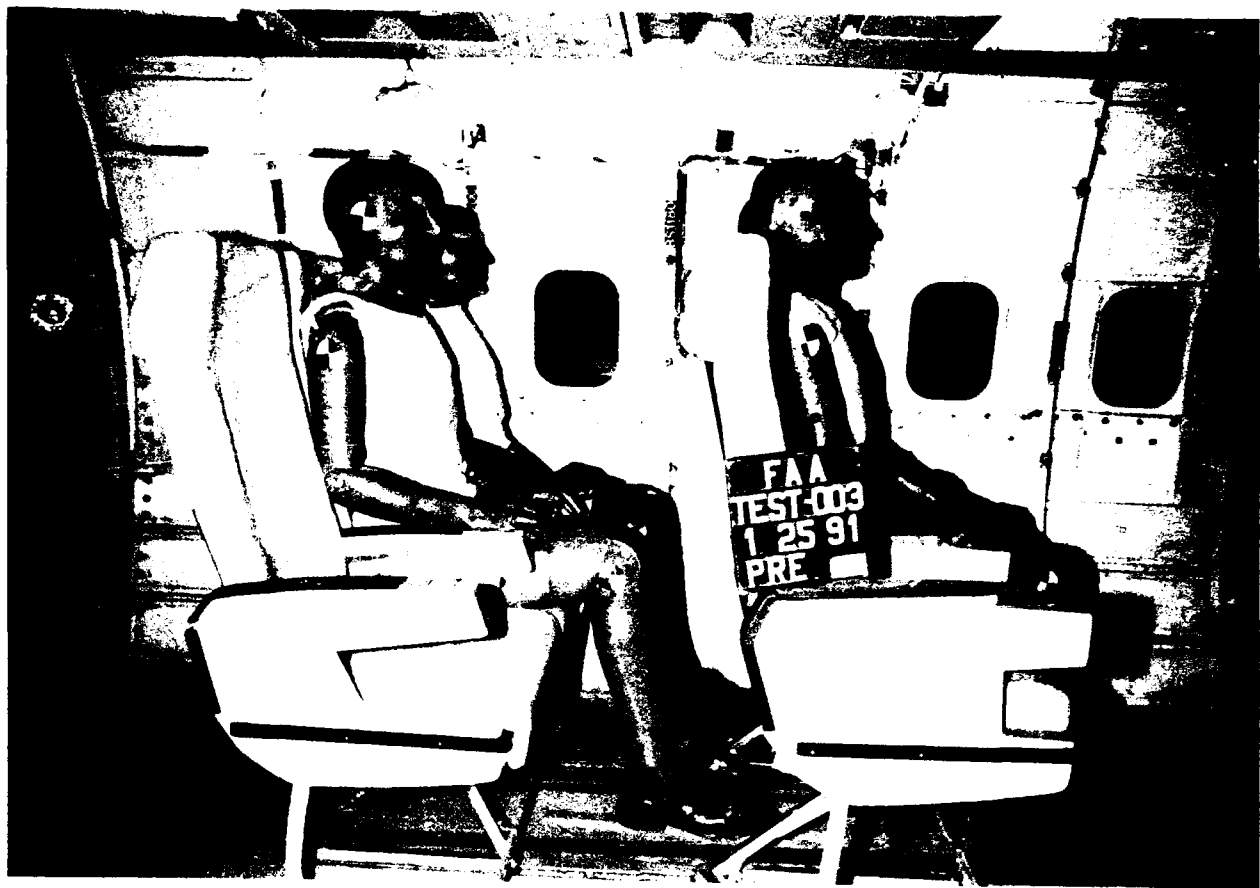


Figure 125. PRE-TEST SEATS AND DUMMIES SIDE VIEW

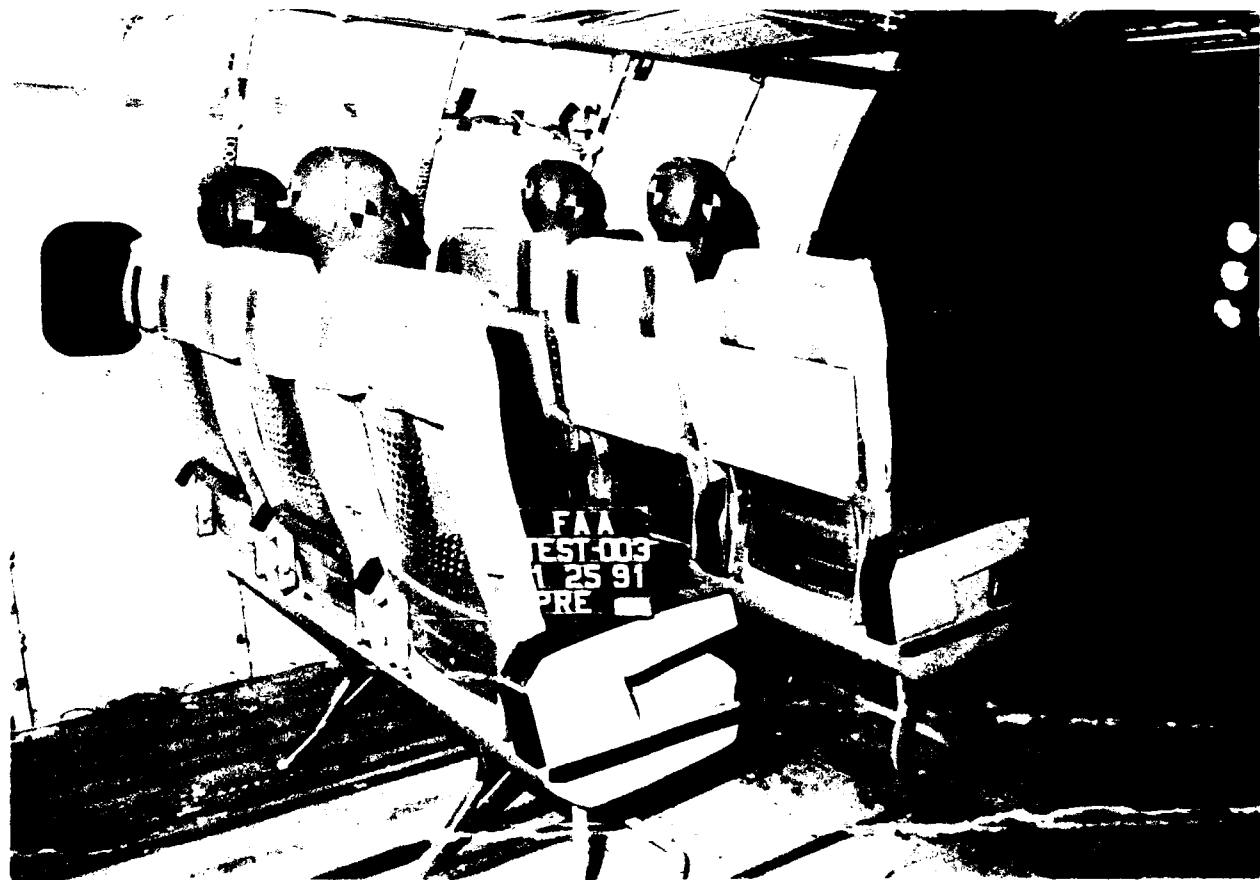


Figure 126. PRE-TEST SEATS AND DUMMIES ANGLE VIEW



Figure 127. PRE-TEST FRONT SEAT REAR VIEW

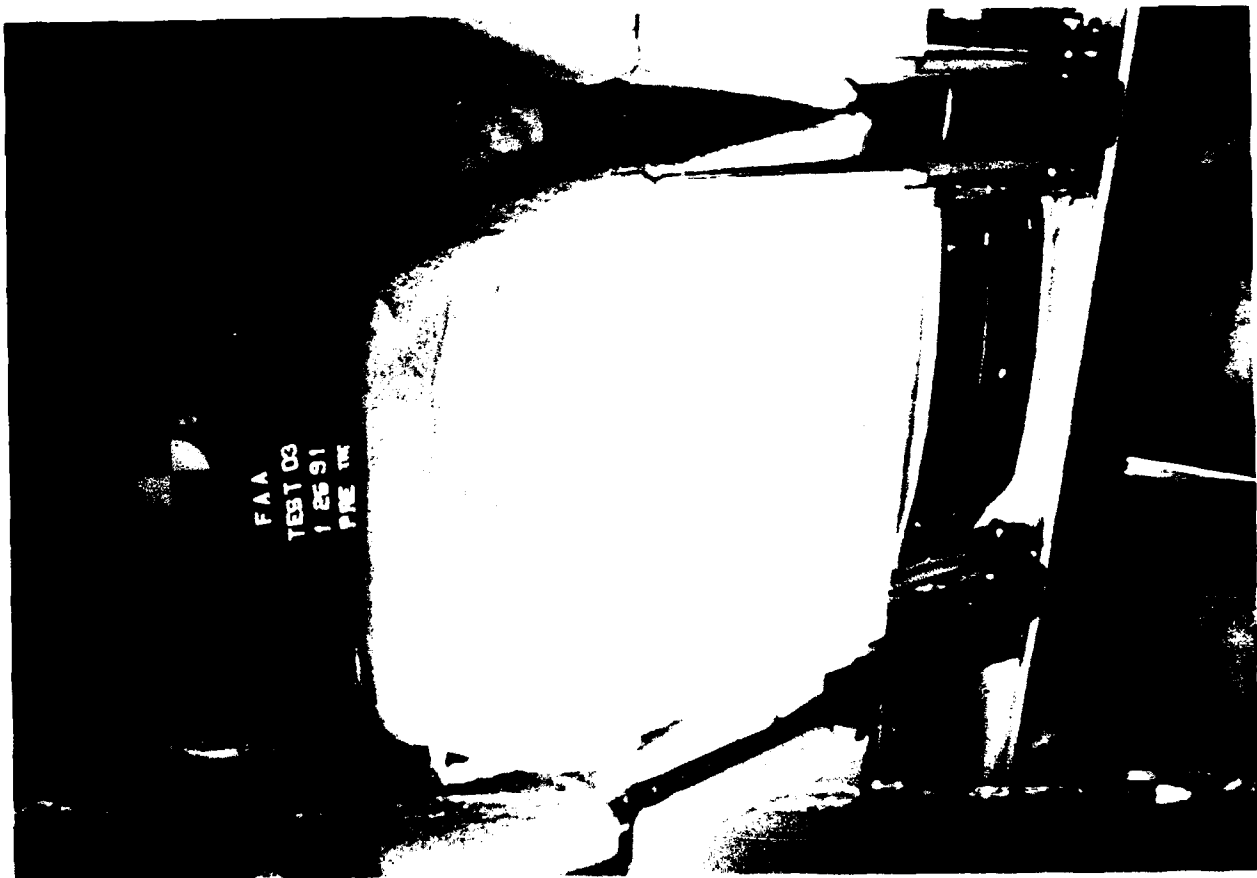


Figure 128. PRE TEST FRONT SEAT CENTER SEAT BACK REAR VIEW

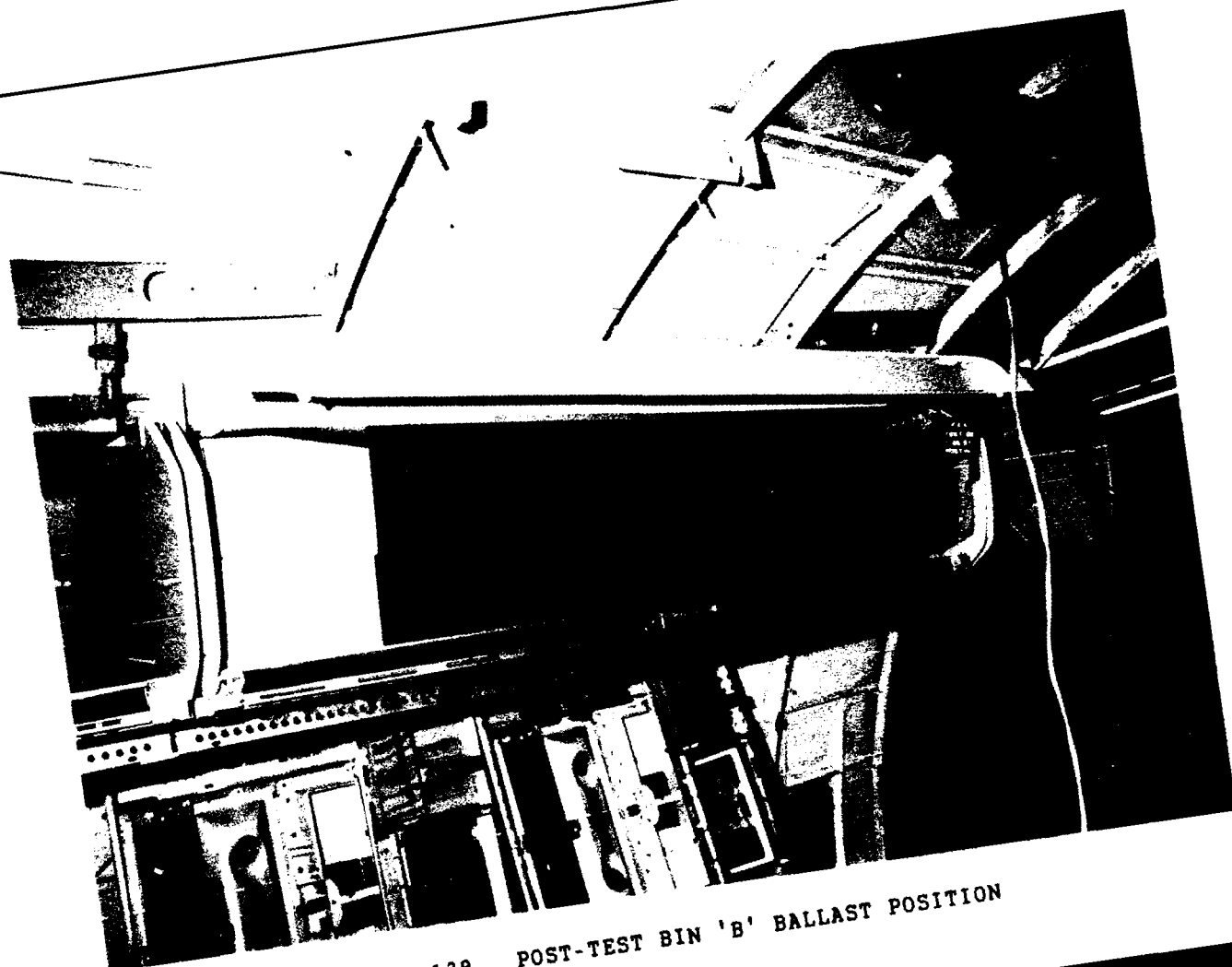


Figure 129. POST-TEST BIN 'B' BALLAST POSITION

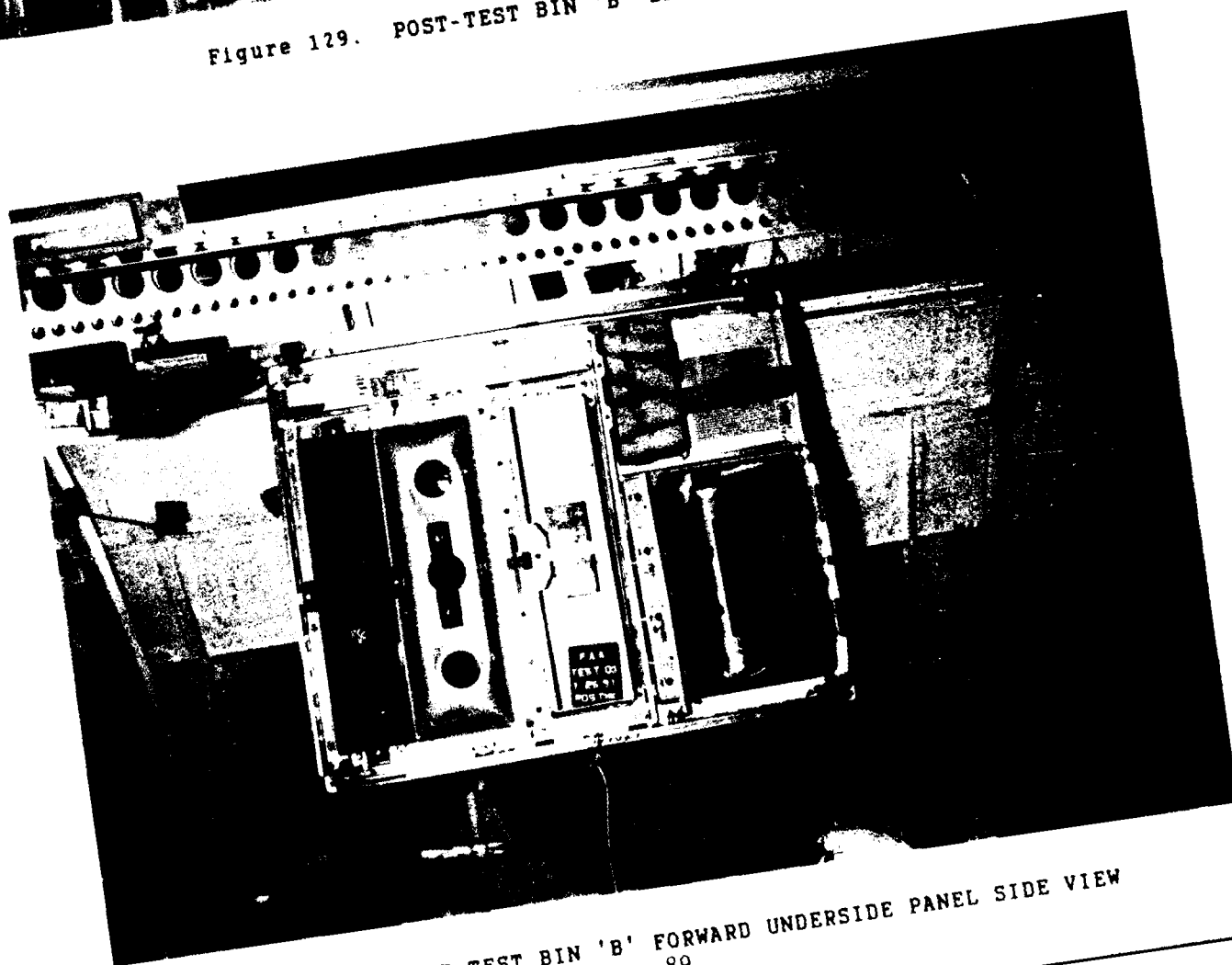


Figure 130. POST-TEST BIN 'B' FORWARD UNDERSIDE PANEL SIDE VIEW

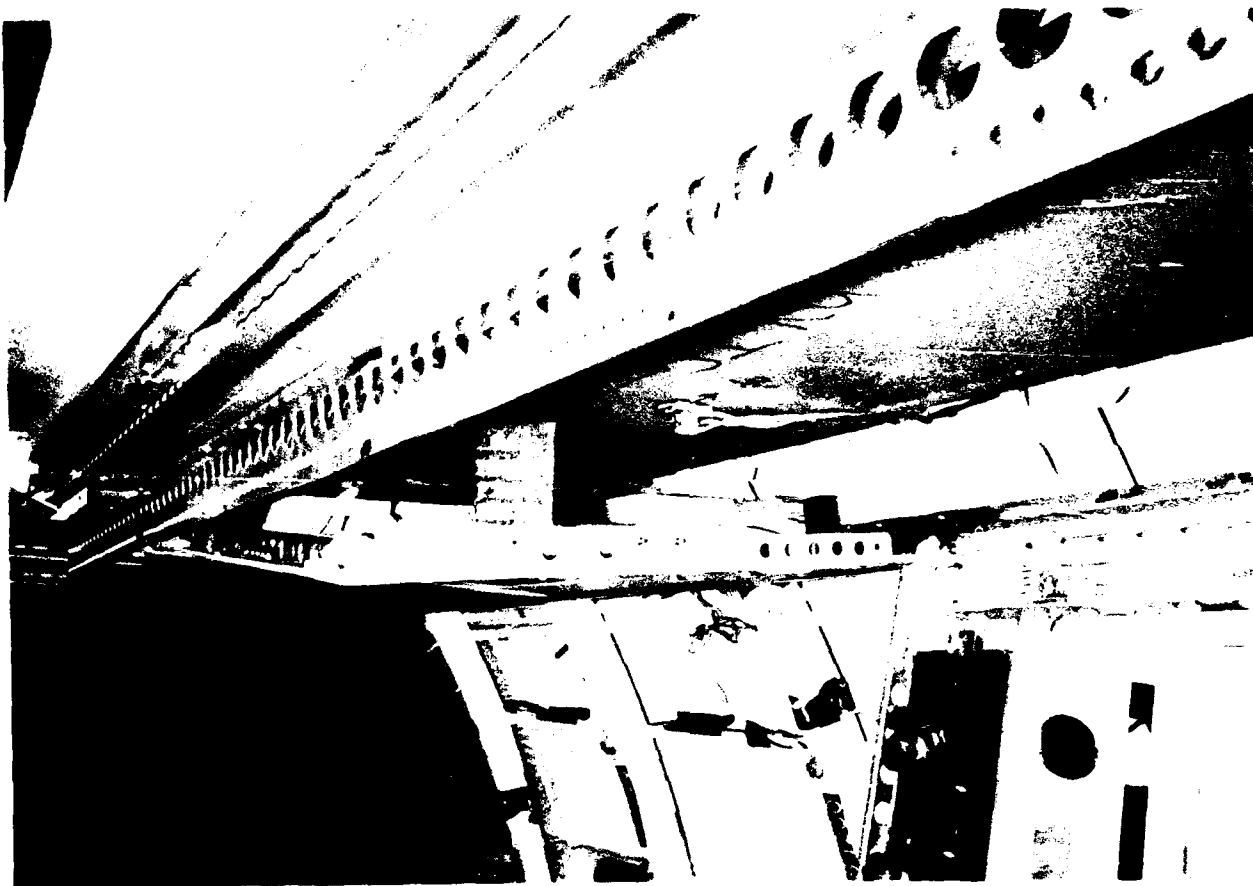


FIGURE 1-1 POST TEST BIN 'B' REAR UNDERSIDE PANEL FRONT VIEW



FIGURE 1-2 POST TEST BIN 'B' FORWARD UNDERSIDE PANEL ACCESS DOOR

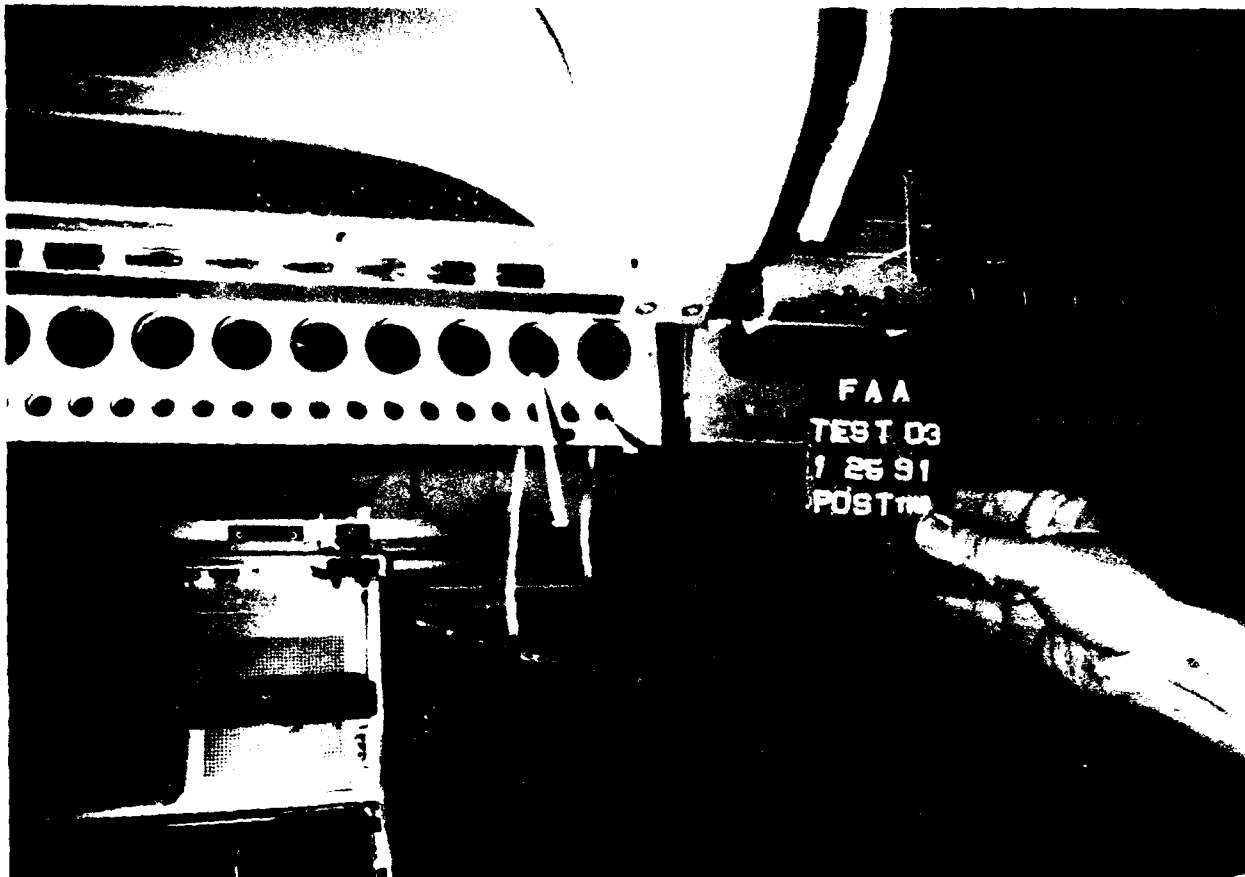


Figure 133. POST-TEST BIN 'B' FORWARD 20" BIN/CENTER 60" BIN LOWER INTERFACE



Figure 134. POST-TEST BIN 'B' FORWARD LOWER LATERAL LINKS



Figure 135. POST-TEST BIN 'B' LINK 8



Figure 136 POST-TEST BIN 'B' REAR LOWER LATERAL LINKS



Figure 137. POST-TEST BIN 'B' LINKS 17, 25, AND FORWARD UPPER LINKS



Figure 138. POST-TEST BIN 'B' FORWARD UPPER LINKS

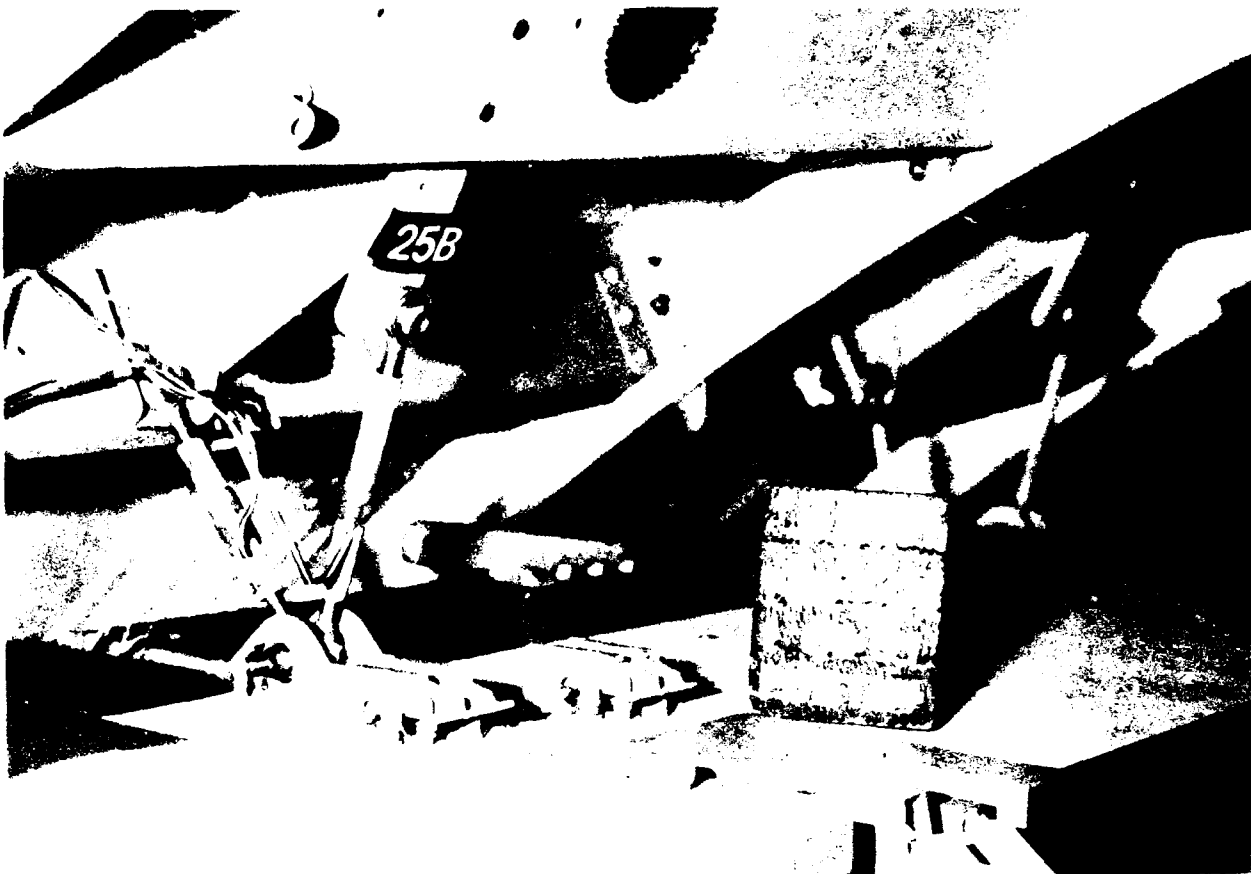


FIGURE 104. F-105 DUAL FUEL SYSTEM, FUEL INLET

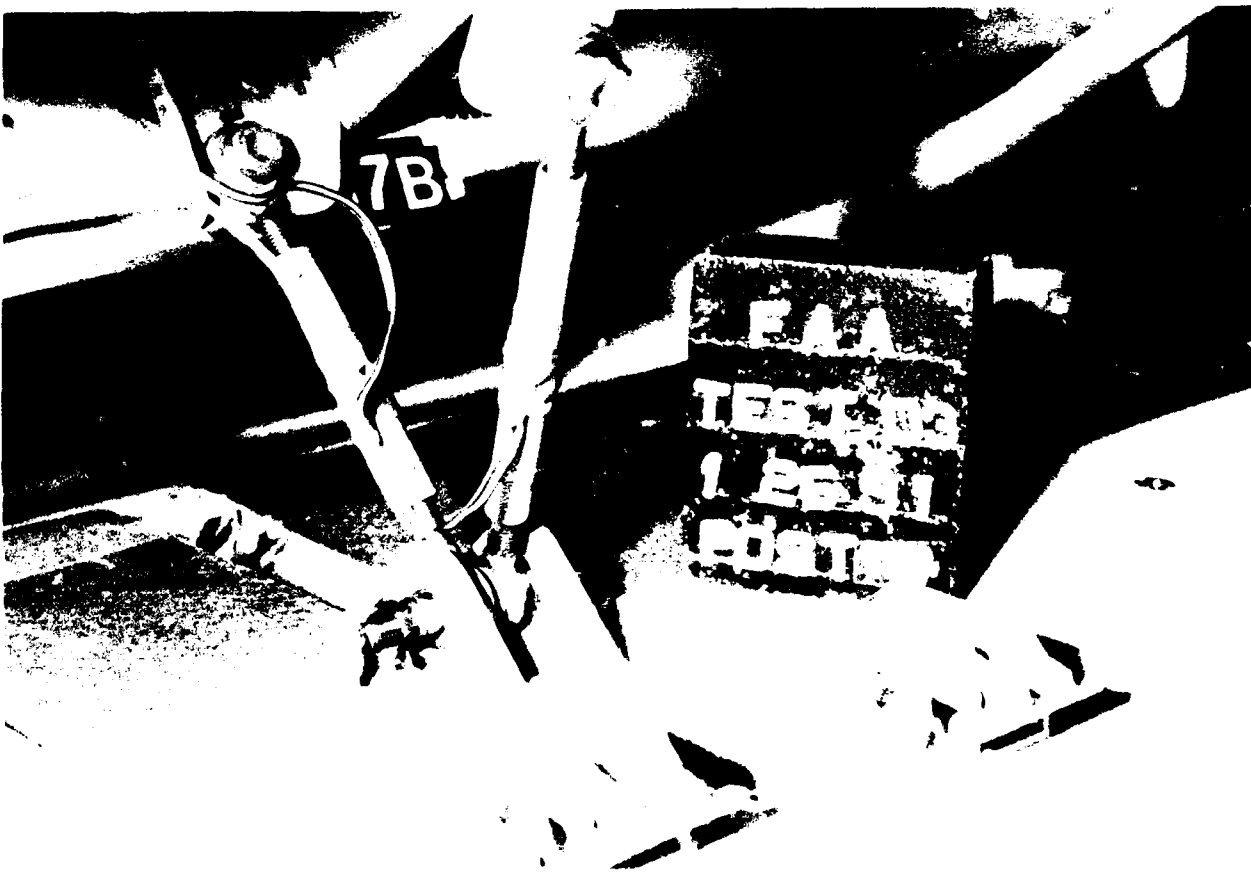


FIGURE 105. F-105 DUAL FUEL SYSTEM, FUEL INLET

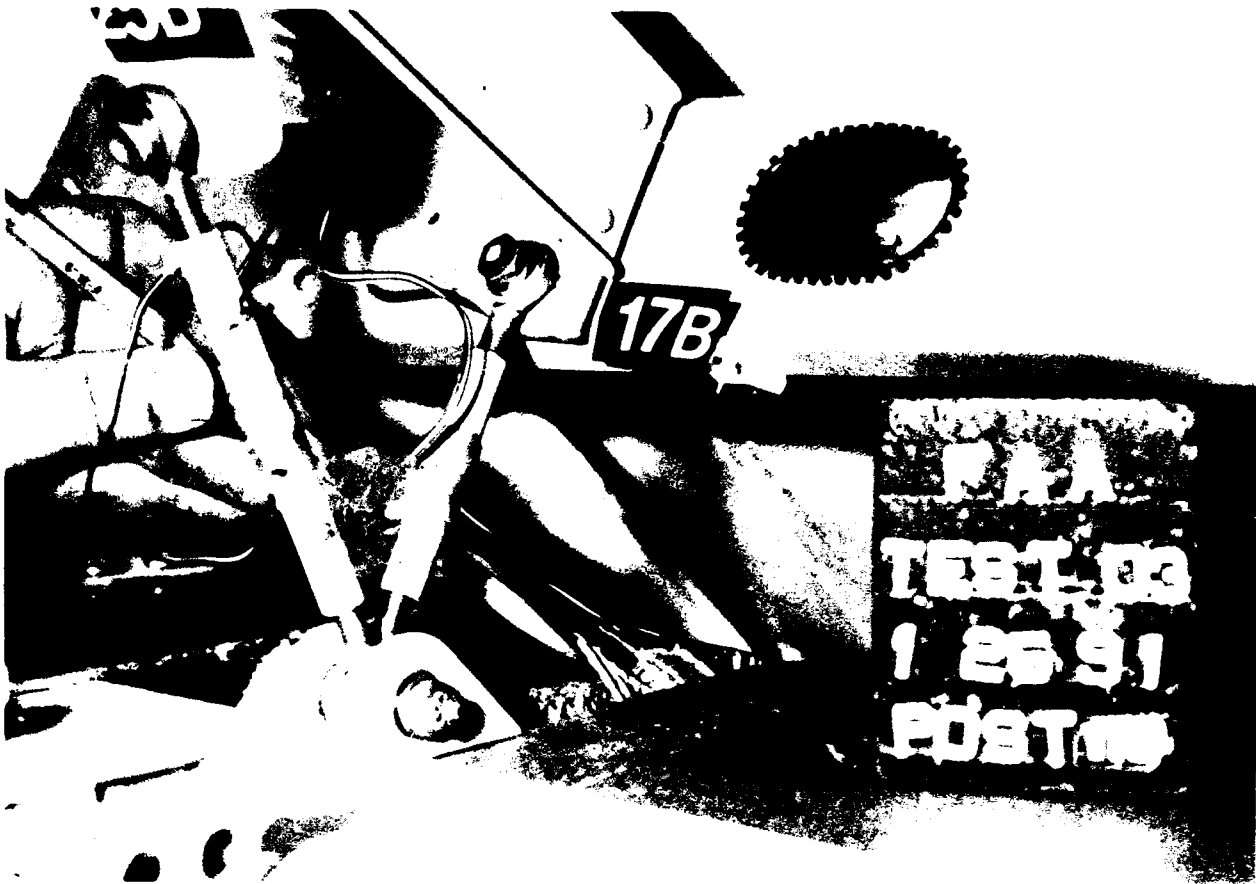


Figure 141. POST-TEST BIN 'B' 60" BIN FORWARD PANEL TOP EDGE OUTBOARD DAMAGE



Figure 142. POST-TEST BIN 'B' 60" BIN FORWARD PANEL TOP EDGE CENTER DAMAGE

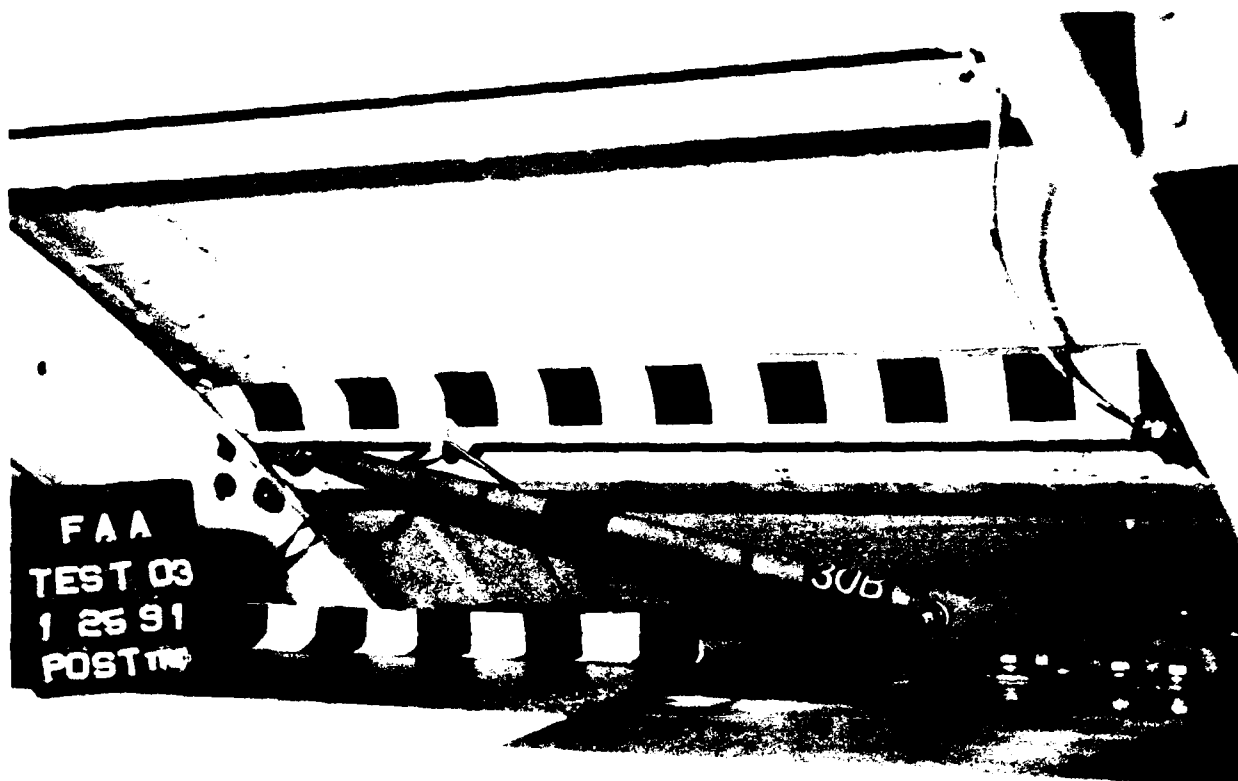


Figure 143. POST-TEST BIN 'B' LINK 30

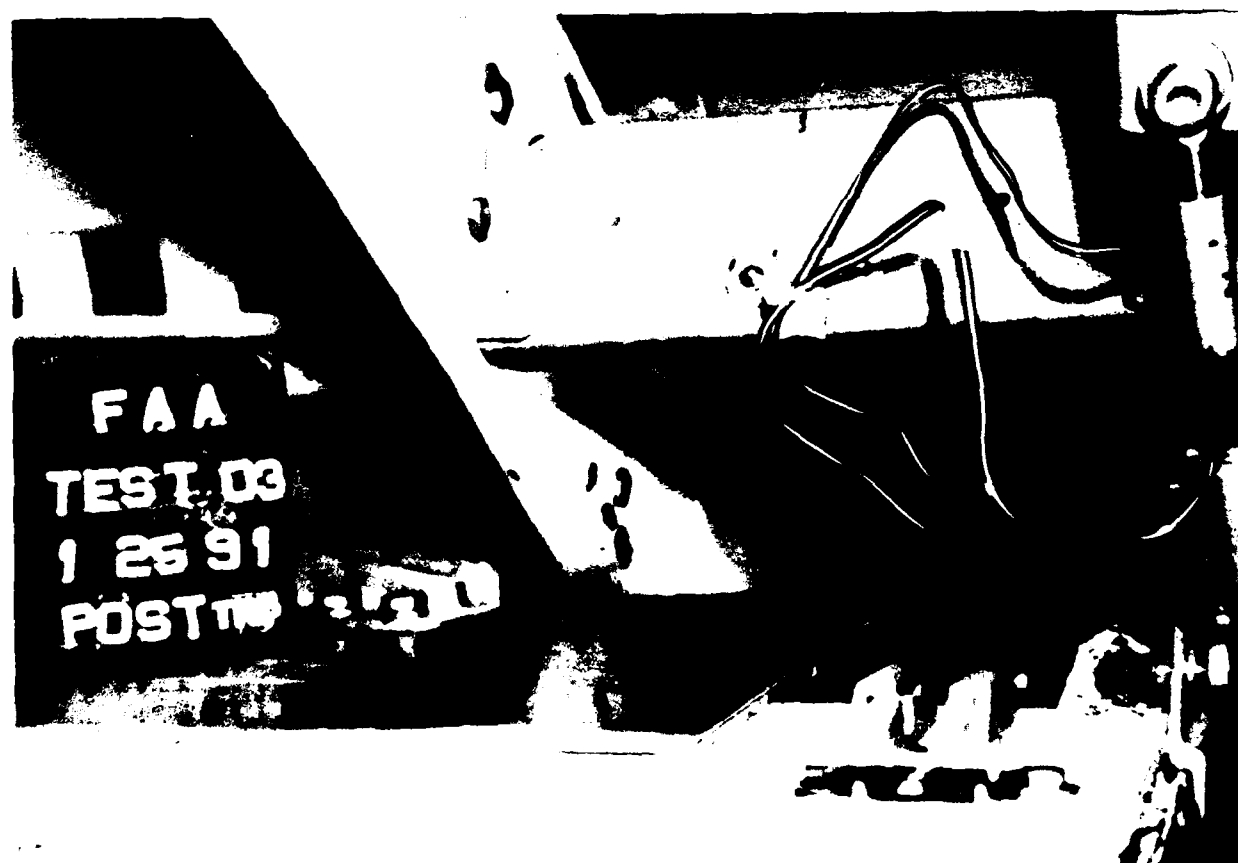


Figure 144 POST TEST BIN 'B' 60" BIN DRAG LINK EXTERIOR REINFORCEMENT PLATE, FORWARD EDGE



Figure 145. POST-TEST BIN 'B' 60" BIN DRAG LINK FITTING/FUSELAGE CONTACT
OVERALL SIDE VIEW



Figure 146. POST TEST BIN 'B' 60" BIN DRAG LINK FITTING/FUSELAGE CONTACT
FRONT ANGLE VIEW

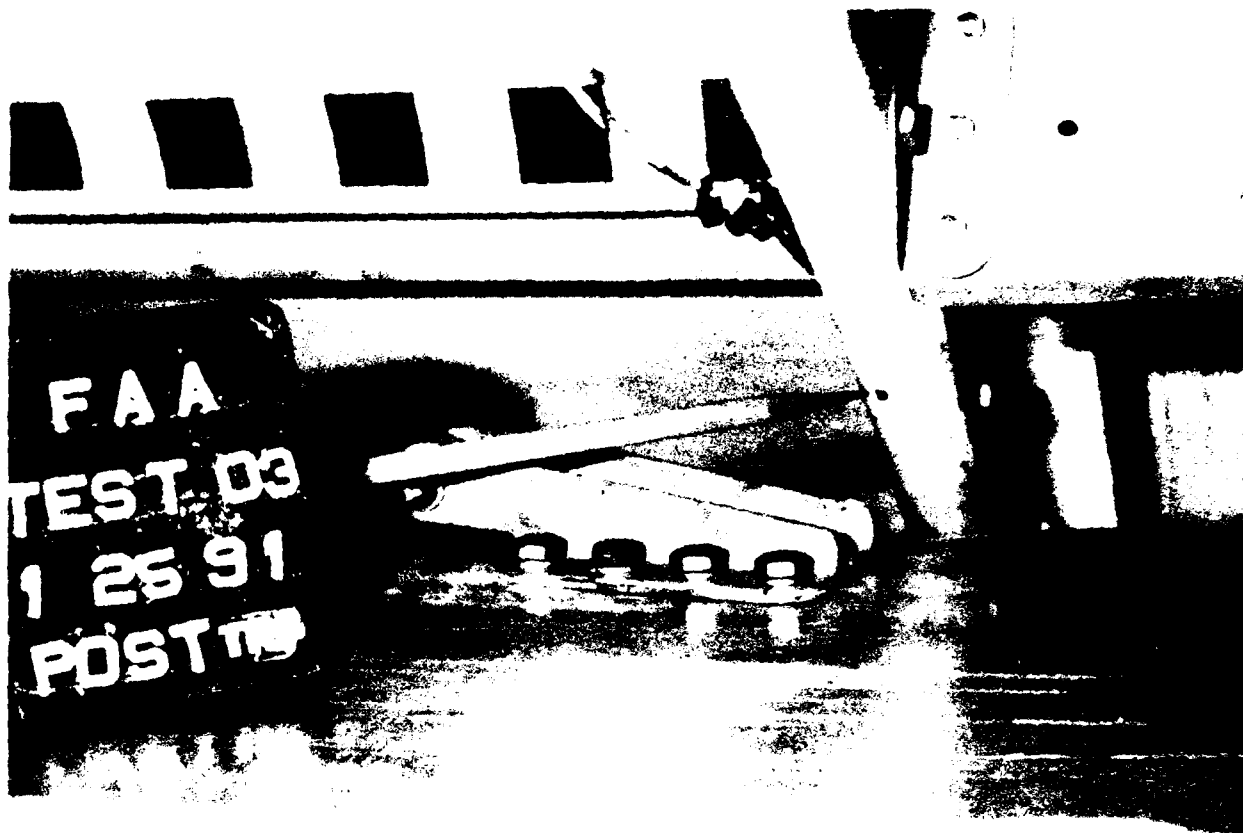


Figure 147. POST-TEST BIN 'B' 60" BIN DRAG LINK FITTING/FUSELAGE CONTACT.
UPPER MARKS ON FUSELAGE



Figure 148. POST TEST BIN 'B' 60" BIN DRAG LINK FITTING FUSELAGE CONTACT.
LOWER MARKS ON FUSELAGE



Figure 149. POST-TEST BIN 'B' 60" BIN DRAG LINK FITTING/FUSELAGE CONTACT, MARKS ON DRAG LINK FITTING



Figure 150. POST TEST BIN 'B' LINKS 18, 28, AND REAR UPPER LINKS

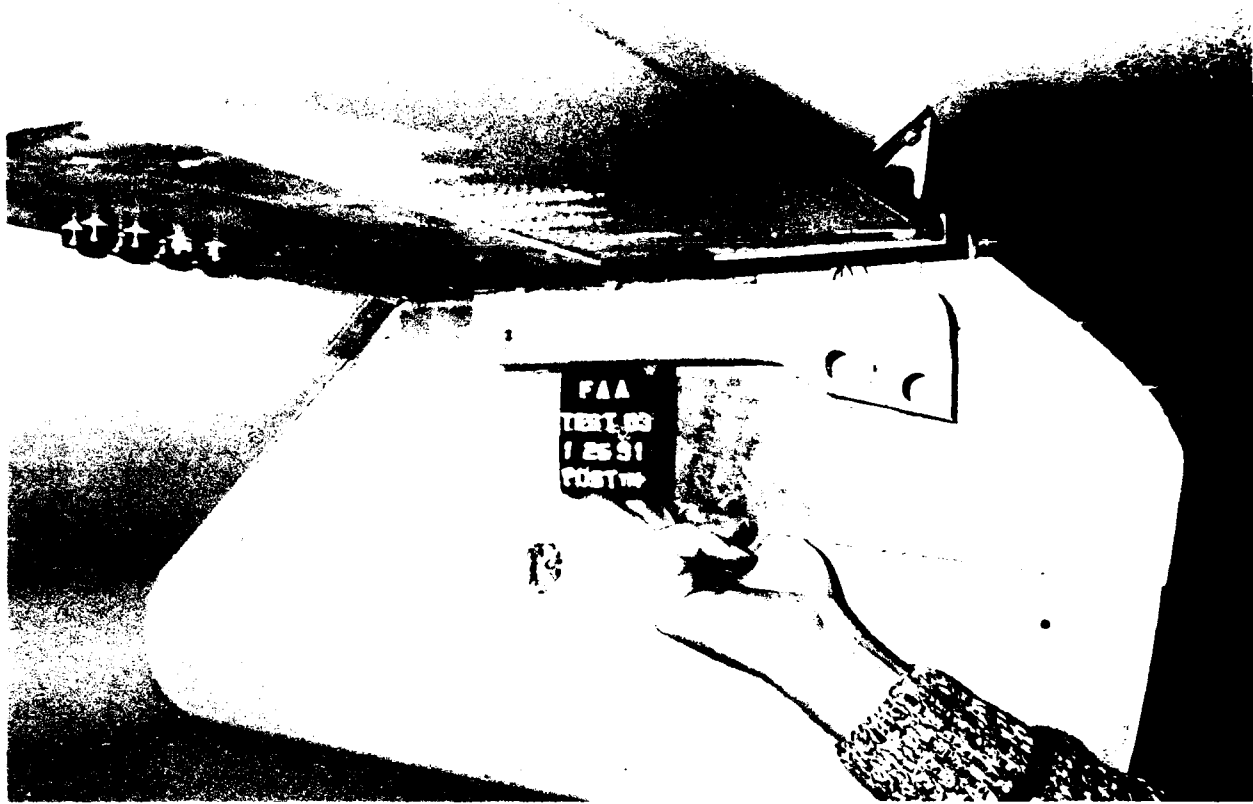


Figure 151. POST-TEST BIN 'B' 60" BIN FORWARD PANEL INTERIOR



Figure 152. POST TEST BIN 'B' 60" BIN DRAG LINK INTERIOR
REINFORCEMENT PLATE



Figure 153. POST-TEST BIN 'A' BALLAST POSITION



Figure 154. POST-TEST BIN 'A' BALLAST DAMAGE

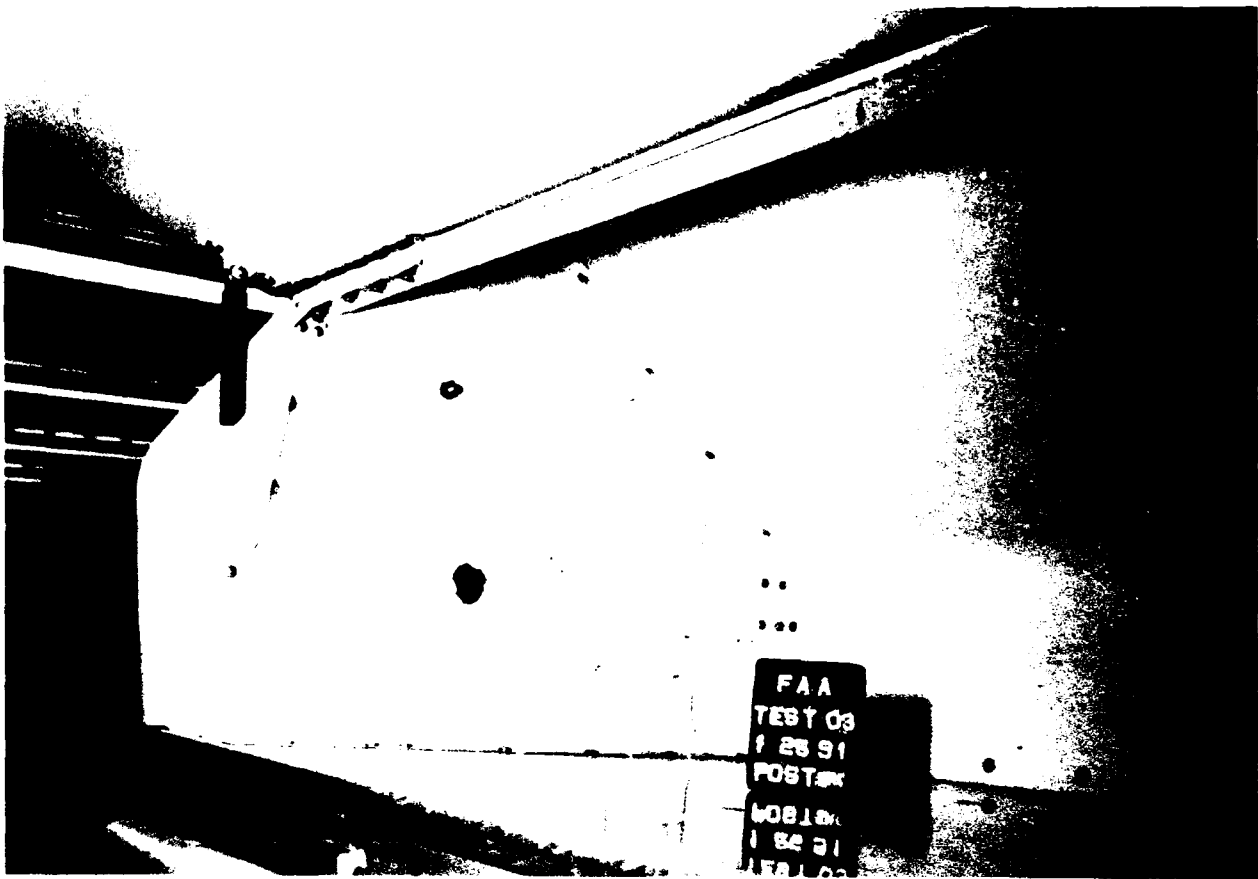


Figure 155. POST-TEST BIN 'A' FORWARD PANEL INTERIOR

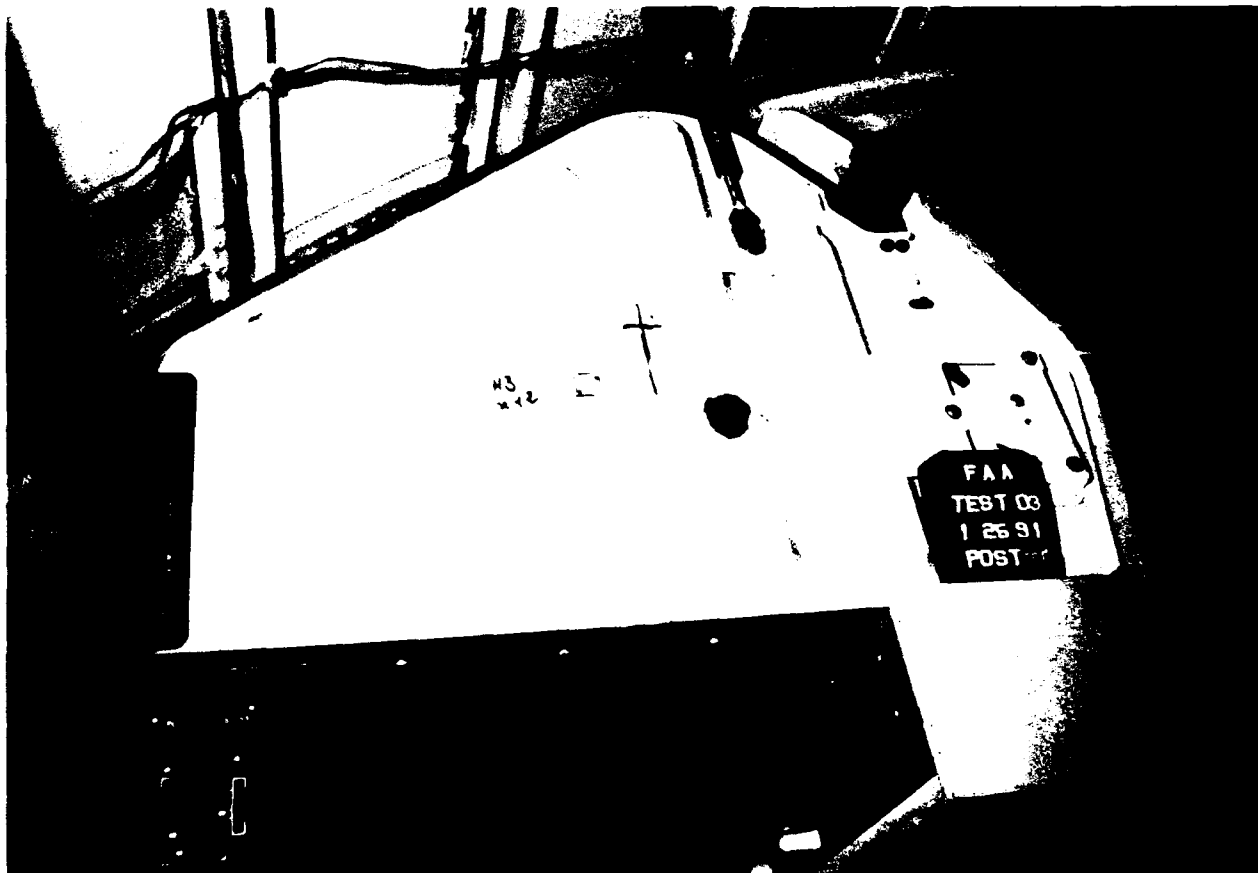


Figure 156. POST-TEST BIN 'A' FORWARD PANEL EXTERIOR

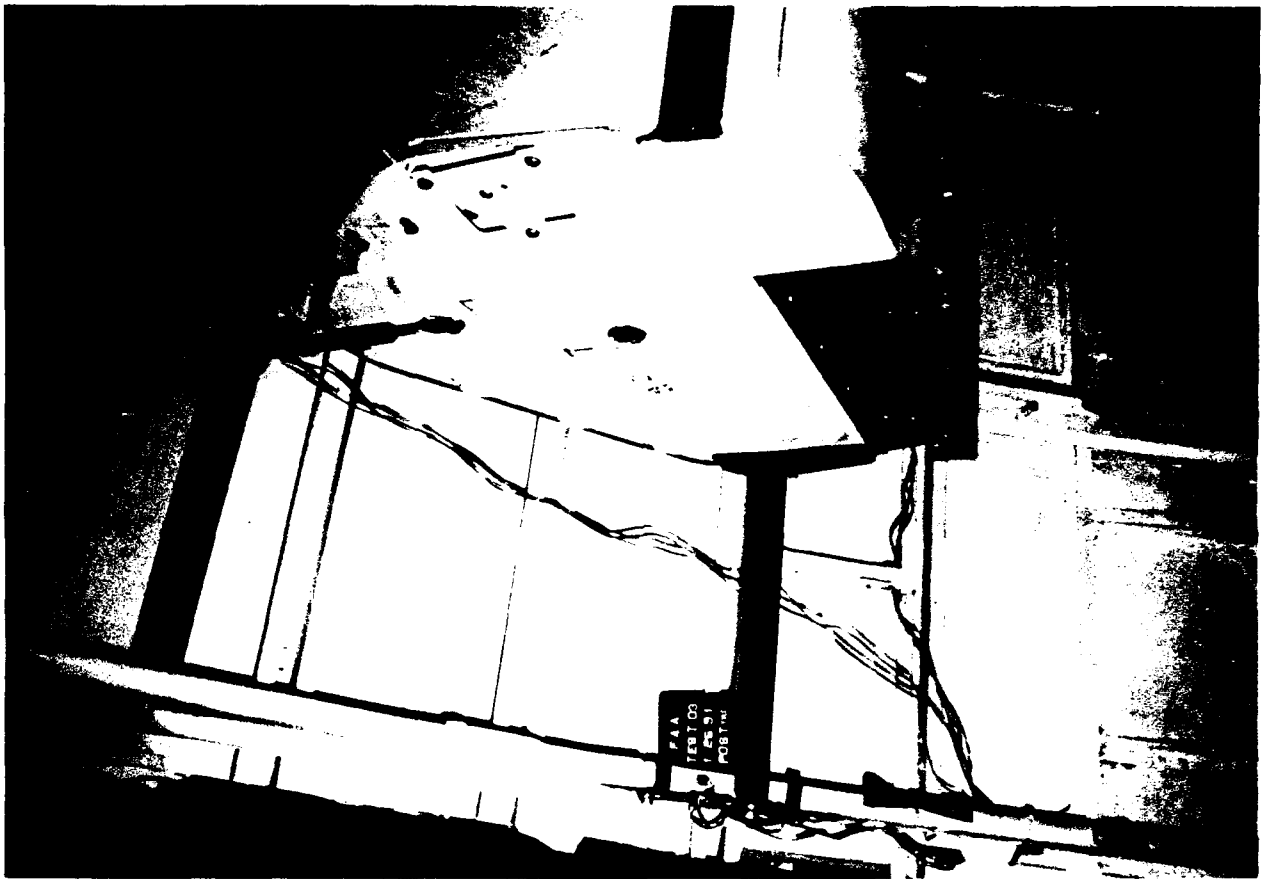


Figure 157. POST-TEST BIN 'A' FORWARD STRUCTURE FRONT ANGLE VIEW



Figure 158. POST-TEST BIN 'A' FRONT SUPPORT BAR

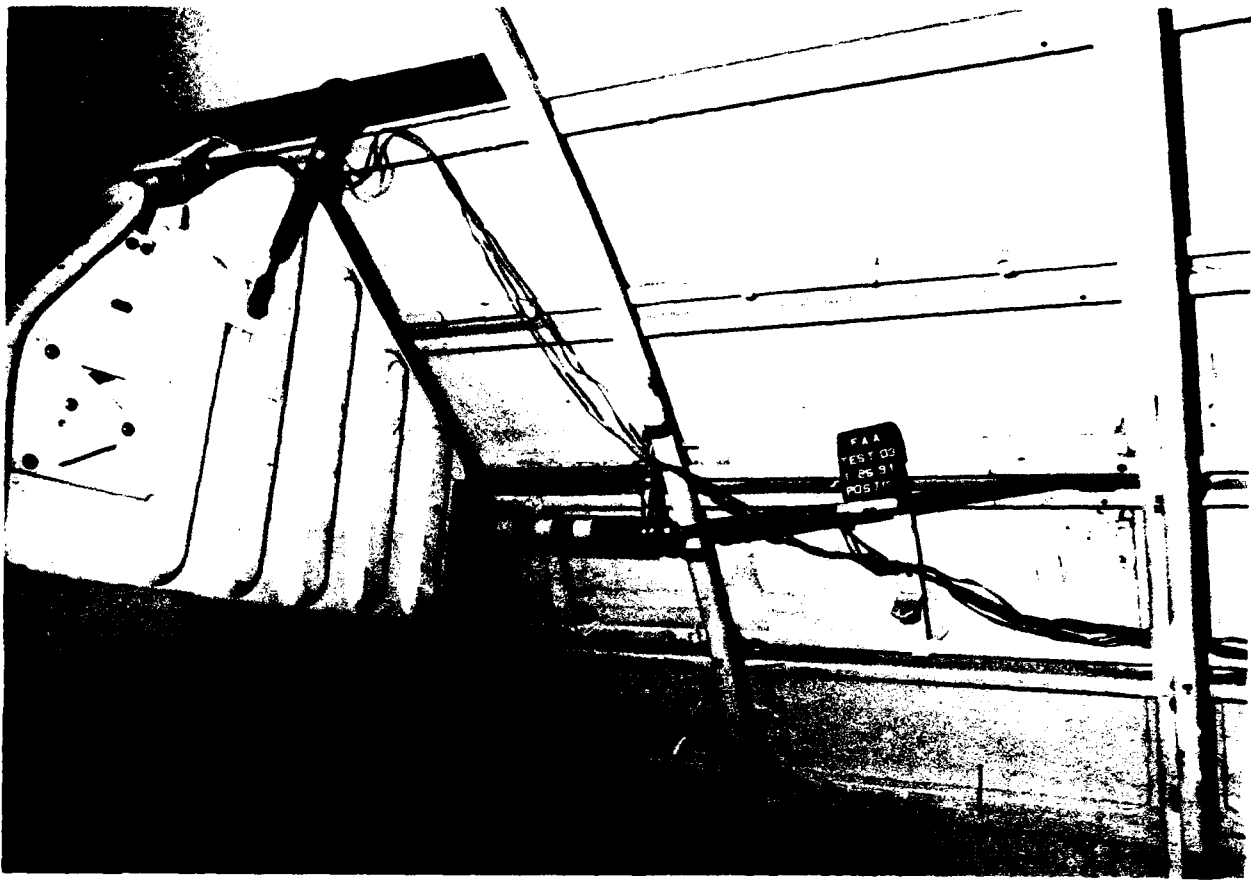


Figure 159. POST-TEST BIN 'A' REAR STRUCTURE REAR ANGLE VIEW

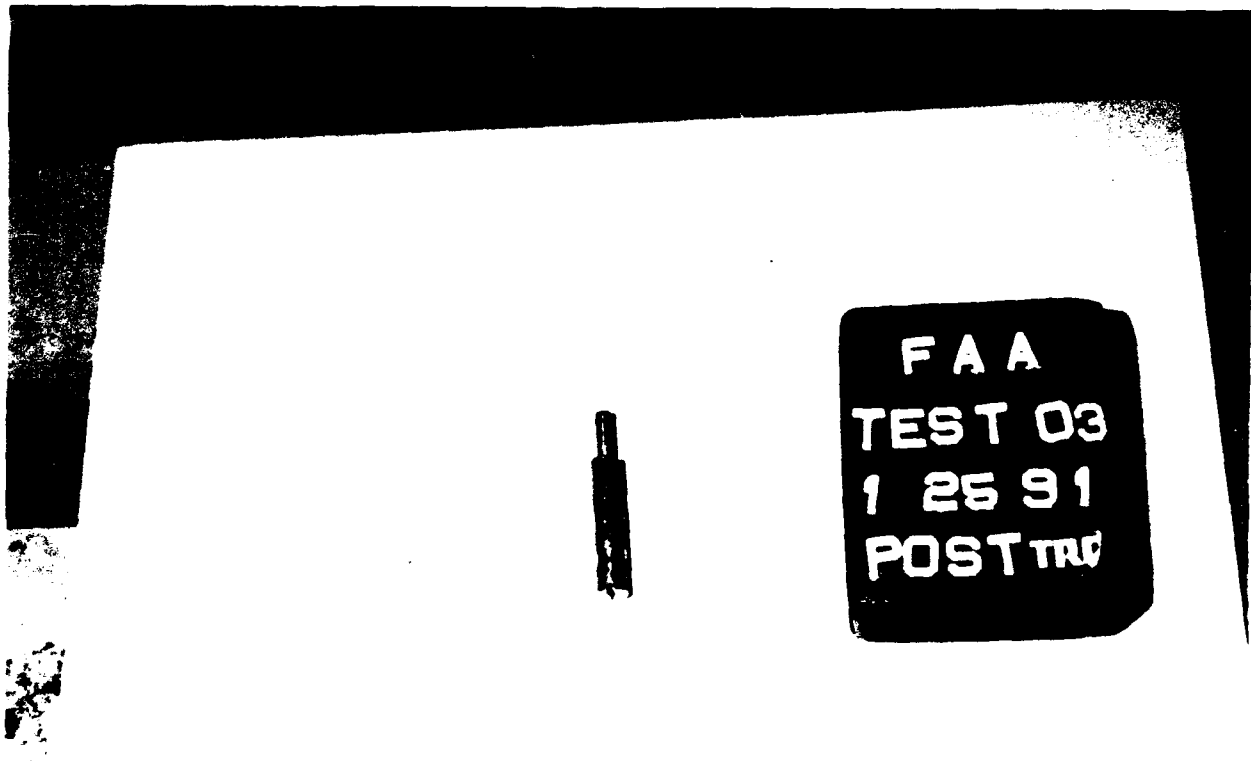


Figure 160. POST-TEST BIN 'A' REAR SUPPORT BAR SHEAR PIN, REMOVED



Figure 161. POST-TEST SEATS, DUMMIES, AND BIN 'B' FRONT ANGLE VIEW



Figure 162. POST-TEST SEATS AND DUMMIES SIDE VIEW

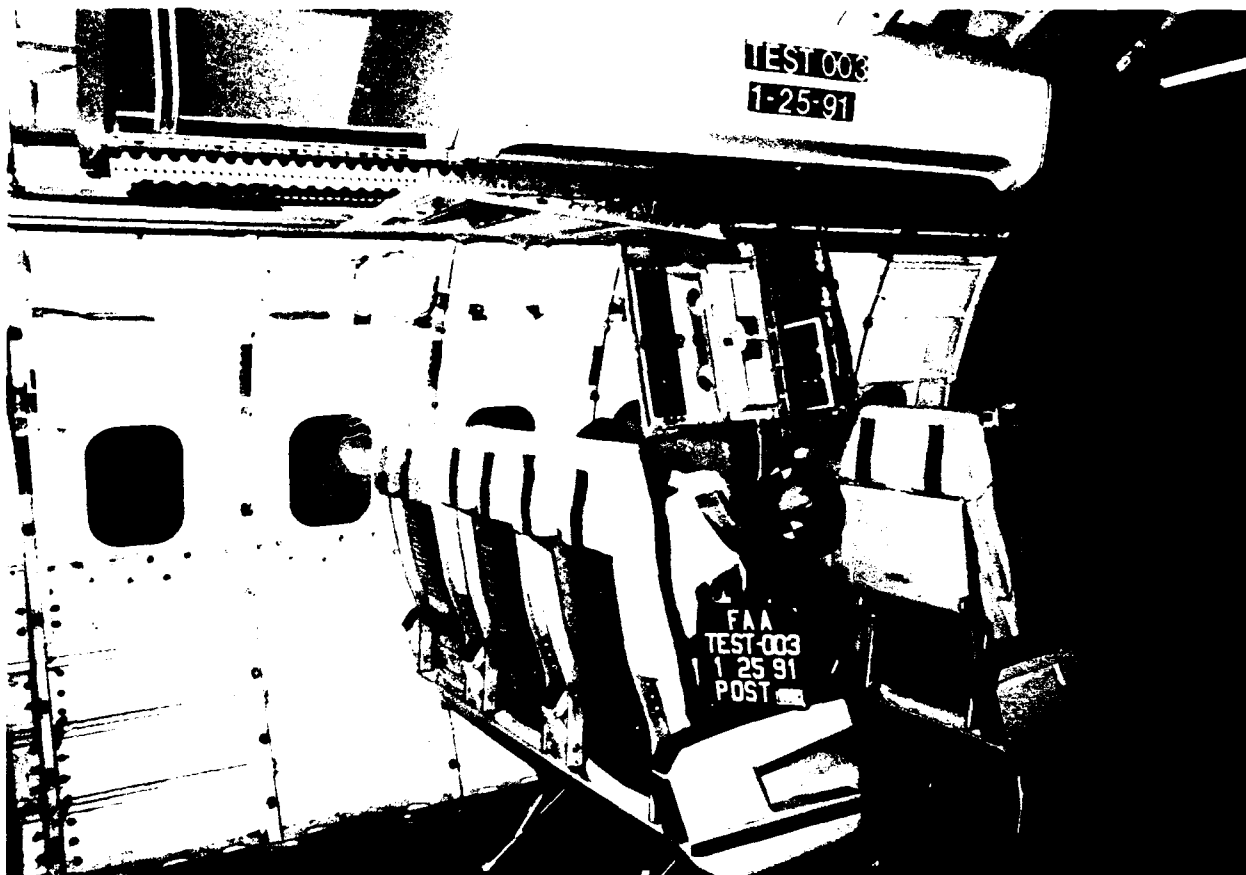


Figure 163. POST-TEST SEATS AND DUMMIES REAR ANGLE VIEW



Figure 164. POST-TEST FRONT SEAT OUTBOARD SEATBACK REAR DUMMY CONTACT



Figure 165. POST-TEST FRONT SEAT CENTER SEAT BACK REAR DUMMY CONTACT

APPENDIX A

INSTRUMENTATION LIST

SLED AND FUSELAGE INSTRUMENTATION

CHANNEL MNEMONIC	CHANNEL TITLE
SLDXG	SLED ACCELERATION
SLDXGA	SLED ACCELERATION REDUNDANT
SLDXVI*	SLED VELOCITY - INTEGRATED
FLFXG	FLOOR FORWARD LONGITUDINAL ACCELERATION
FLFXV*	FLOOR FORWARD LONGITUDINAL VELOCITY
FLFYG	FLOOR FORWARD LATERAL ACCELERATION
FLFZG	FLOOR FORWARD VERTICAL ACCELERATION
FLFRG	FLOOR FORWARD RESULTANT ACCELERATION
FLAXG	FLOOR AFT LONGITUDINAL ACCELERATION
FLAXV*	FLOOR AFT LONGITUDINAL VELOCITY
FLAYG	FLOOR AFT LATERAL ACCELERATION
FLAZG	FLOOR AFT VELOCITY ACCELERATION
FLARG*	FLOOR AFT RESULTANT ACCELERATION
FMTXG	FUSELAGE MID TOP LONGITUDINAL ACCELERATION
FMTZG	FUSELAGE MID TOP VERTICAL ACCELERATION
FMSXG	FUSELAGE MID STARBOARD LONGITUDINAL ACCELERATION
FMSZG	FUSELAGE MID STARBOARD VERTICAL ACCELERATION
FATXG	FUSELAGE AFT TOP LONGITUDINAL ACCELERATION
FATZG	FUSELAGE AFT TOP VERTICAL ACCELERATION
FASXG	FUSELAGE AFT STARBOARD LONGITUDINAL ACCELERATION
FASZG	FUSELAGE AFT STARBOARD VERTICAL ACCELERATION

*CALCULATED DATA CHANNELS

OVERHEAD STORAGE BIN INSTRUMENTATION

CHANNEL MNEMONIC	CHANNEL TITLE
BBXG	BIN 'B' LONGITUDINAL ACCELERATION
BBYG	BIN 'B' LATERAL ACCELERATION
BBZG	BIN 'B' VERTICAL ACCELERATION
HBXG	BIN 'A' LONGITUDINAL ACCELERATION
HBYG	BIN 'A' LATERAL ACCELERATION
HBZG	BIN 'A' VERTICAL ACCELERATION
T1BS	BIN 'B', LINK 1 LOAD
T2BS	BIN 'B', LINK 2 LOAD
T3BS	BIN 'B', LINK 3 LOAD
T4BS	BIN 'B', LINK 4 LOAD
T5BS	BIN 'B', LINK 5 LOAD
T6BS	BIN 'B', LINK 6 LOAD
T7BS	BIN 'B', LINK 7 LOAD
T8BS	BIN 'B', LINK 8 LOAD
T13BS	BIN 'B', LINK 13 LOAD
T14BS	BIN 'B', LINK 14 LOAD
T15BS	BIN 'B', LINK 15 LOAD
T16BS	BIN 'B', LINK 16 LOAD
T17BS	BIN 'B', LINK 17 LOAD
T18BS	BIN 'B', LINK 18 LOAD
T21BS	BIN 'B', LINK 21 LOAD
T22BS	BIN 'B', LINK 22 LOAD
T23BS	BIN 'B', LINK 23 LOAD
T24BS	BIN 'B', LINK 24 LOAD
T25BS	BIN 'B', LINK 25 LOAD
T28BS	BIN 'B', LINK 28 LOAD
T30BS	BIN 'B', LINK 30 LOAD
T32BS	BIN 'B', LINK 32 LOAD
T3HS	BIN 'A', LINK 3 LOAD
T4HS	BIN 'A', LINK 4 LOAD
T5HS	BIN 'A', LINK 5 LOAD
T6HS	BIN 'A', LINK 6 LOAD

OVERHEAD STORAGE BIN INSTRUMENTATION

CHANNEL MNEMONIC	CHANNEL TITLE
T7HS	BIN 'A', LINK 7 LOAD
T8HS	BIN 'A', LINK 8 LOAD
T9HS	BIN 'A', LINK 9 LOAD
T10HS	BIN 'A', LINK 10 LOAD
T11HS	BIN 'A', LINK 11 LOAD
T13HS	BIN 'A', LINK 13 LOAD
T14HS	BIN 'A', LINK 14 LOAD

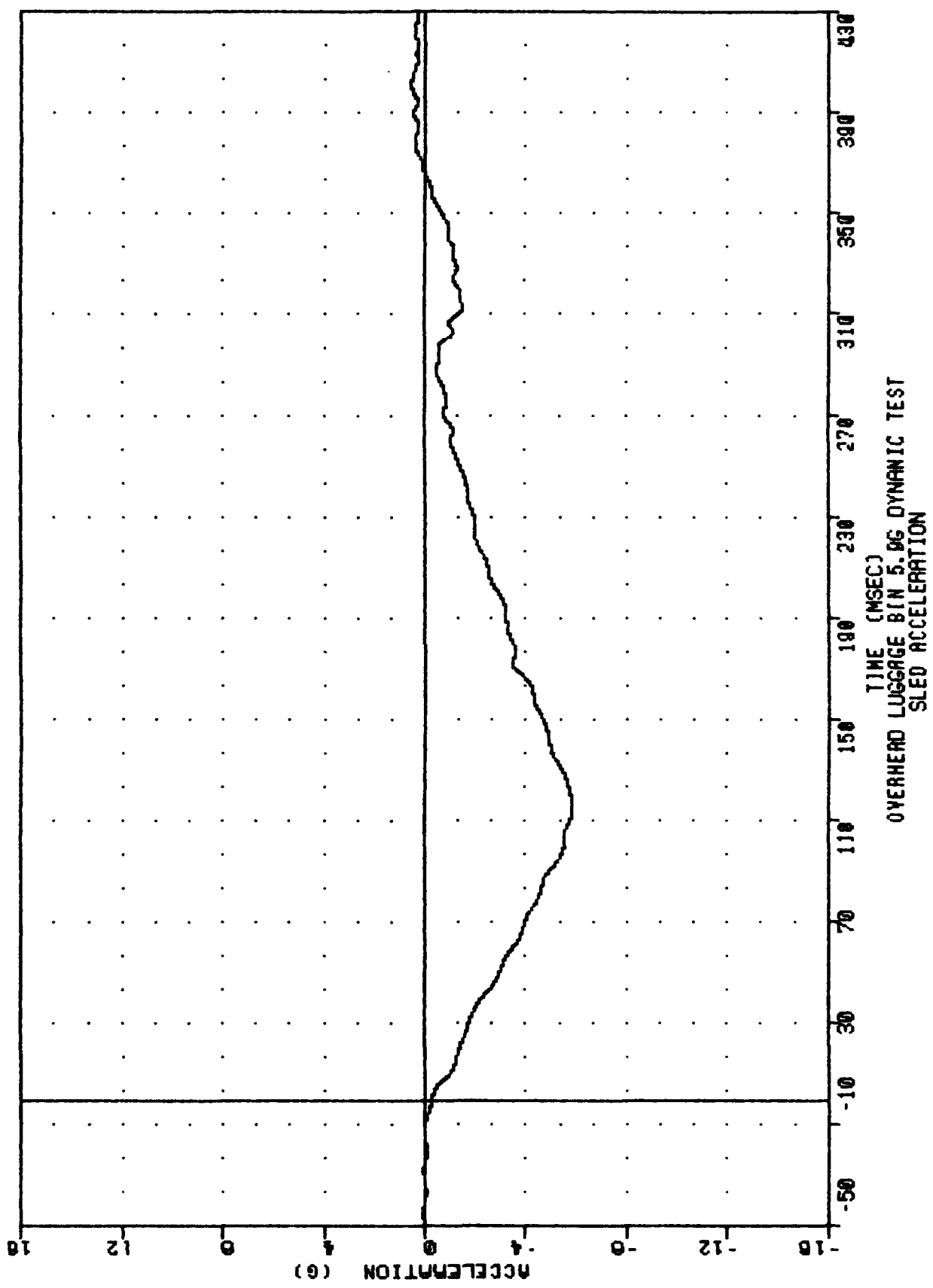
APPENDIX B

DATA PLOTS

TEST 001

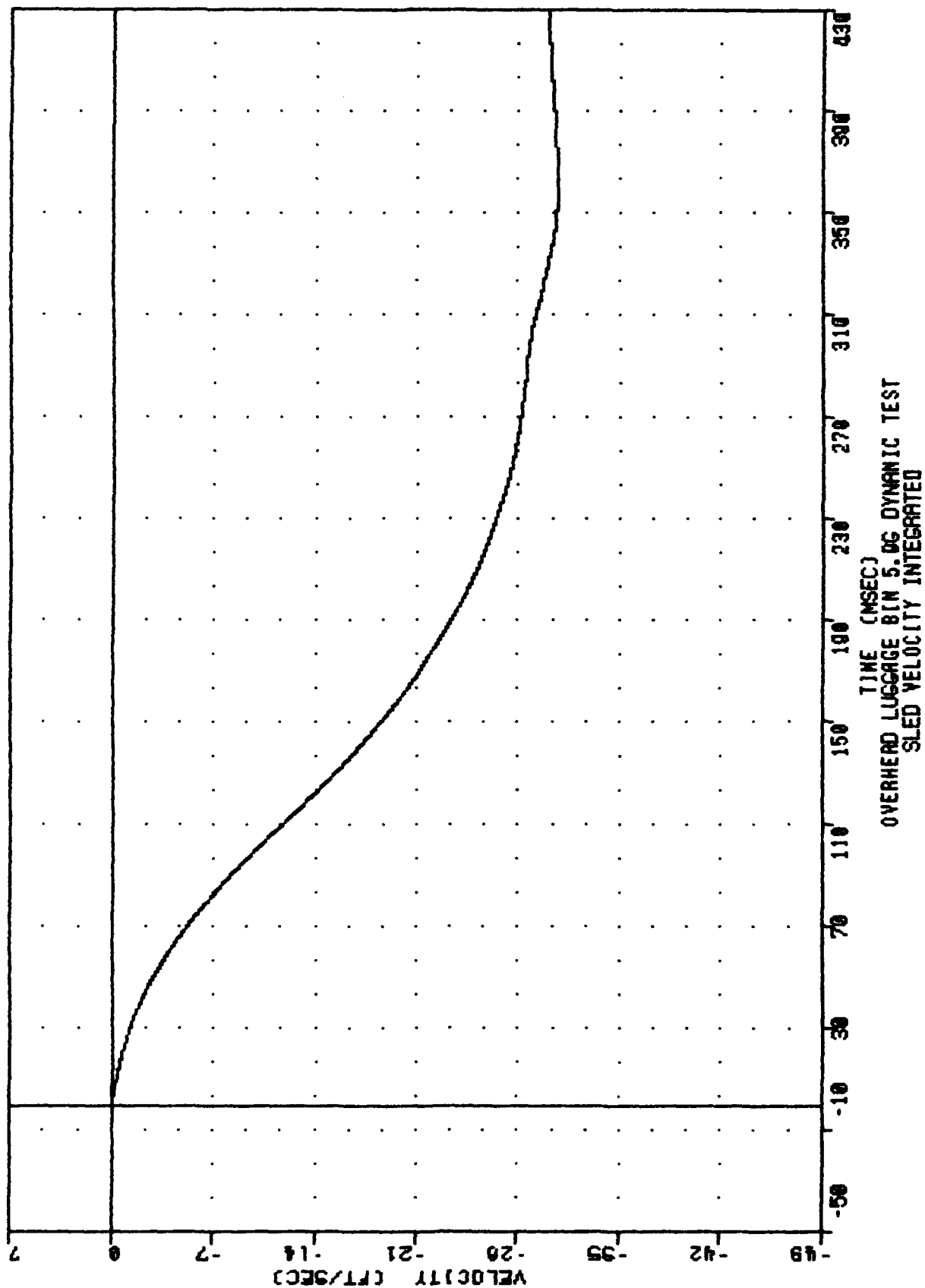
FAR
 91023
 3LOX6

. TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -5.88e 116.00 , 0.53 e 400.68

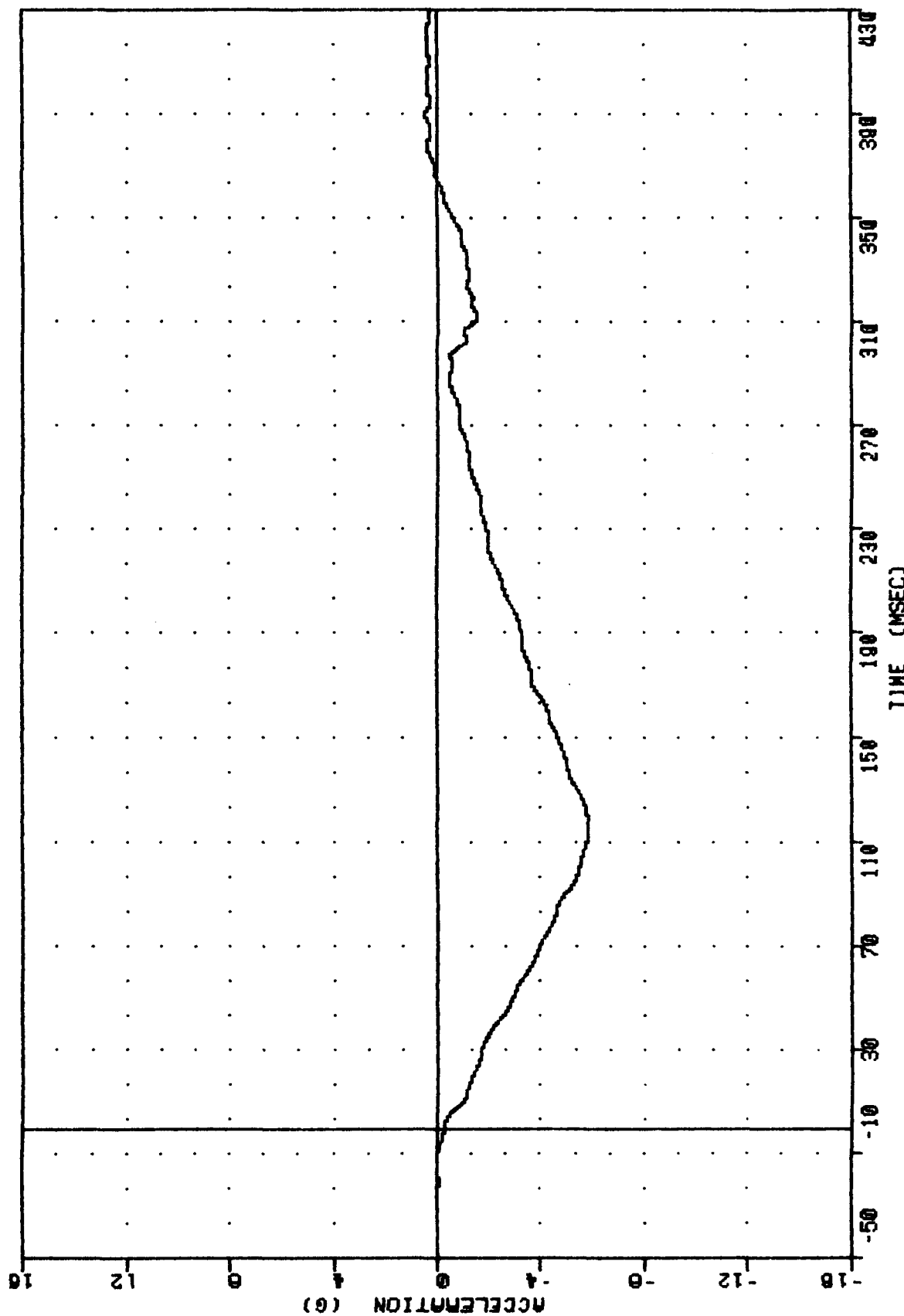


OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 SLED ACCELERATION

FRA 91023 3LOXYI
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 300/ 949/ -40
 MIN. MAX VALUES : -50.740 301.13, 0.010 -27.65

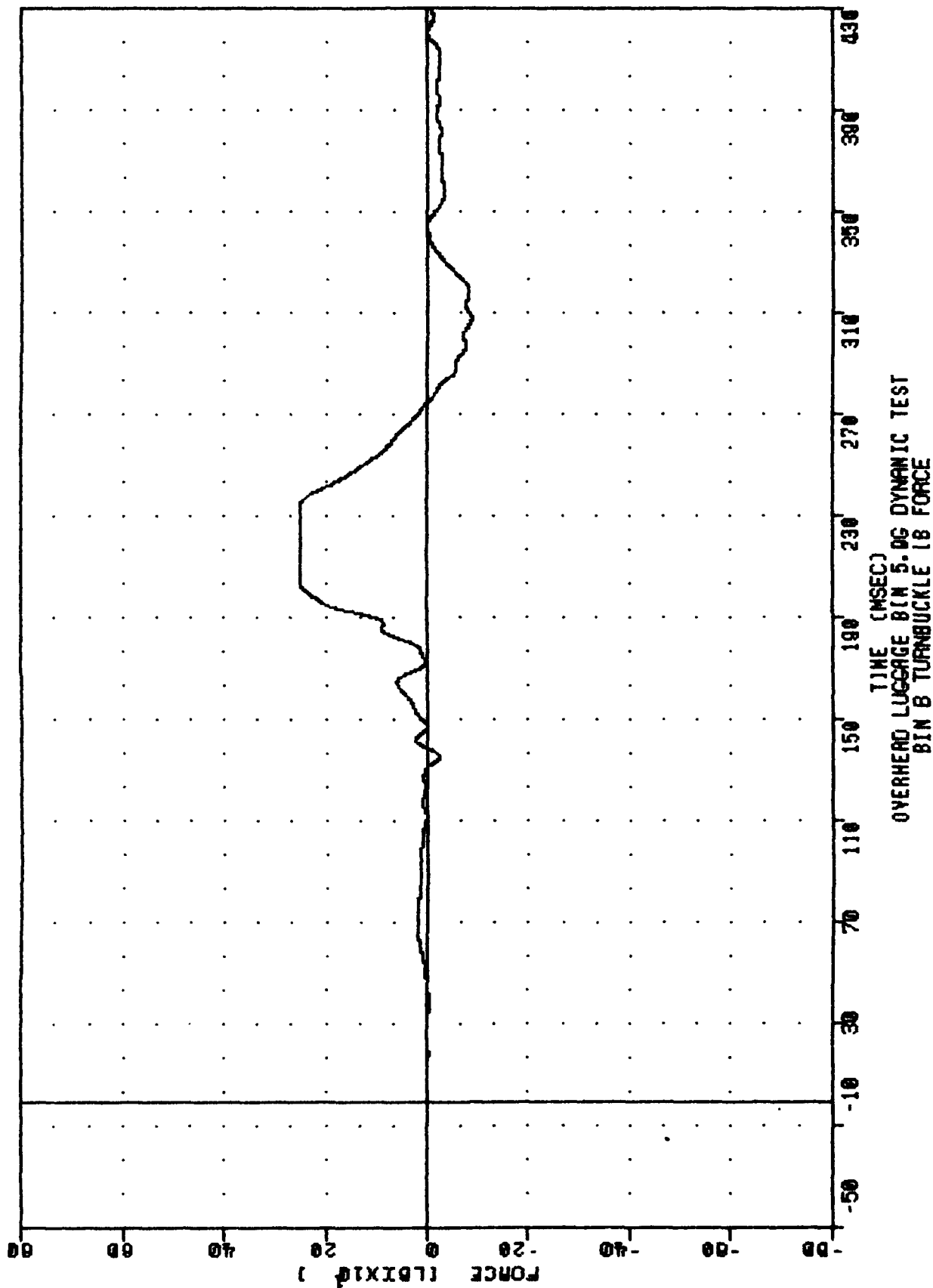


FRA . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 91023 FILTER = 8LPF 100/ 316/ -40
 9LOX6A MIN, MAX VALUES : -5.84 118.88, 0.45 389.83

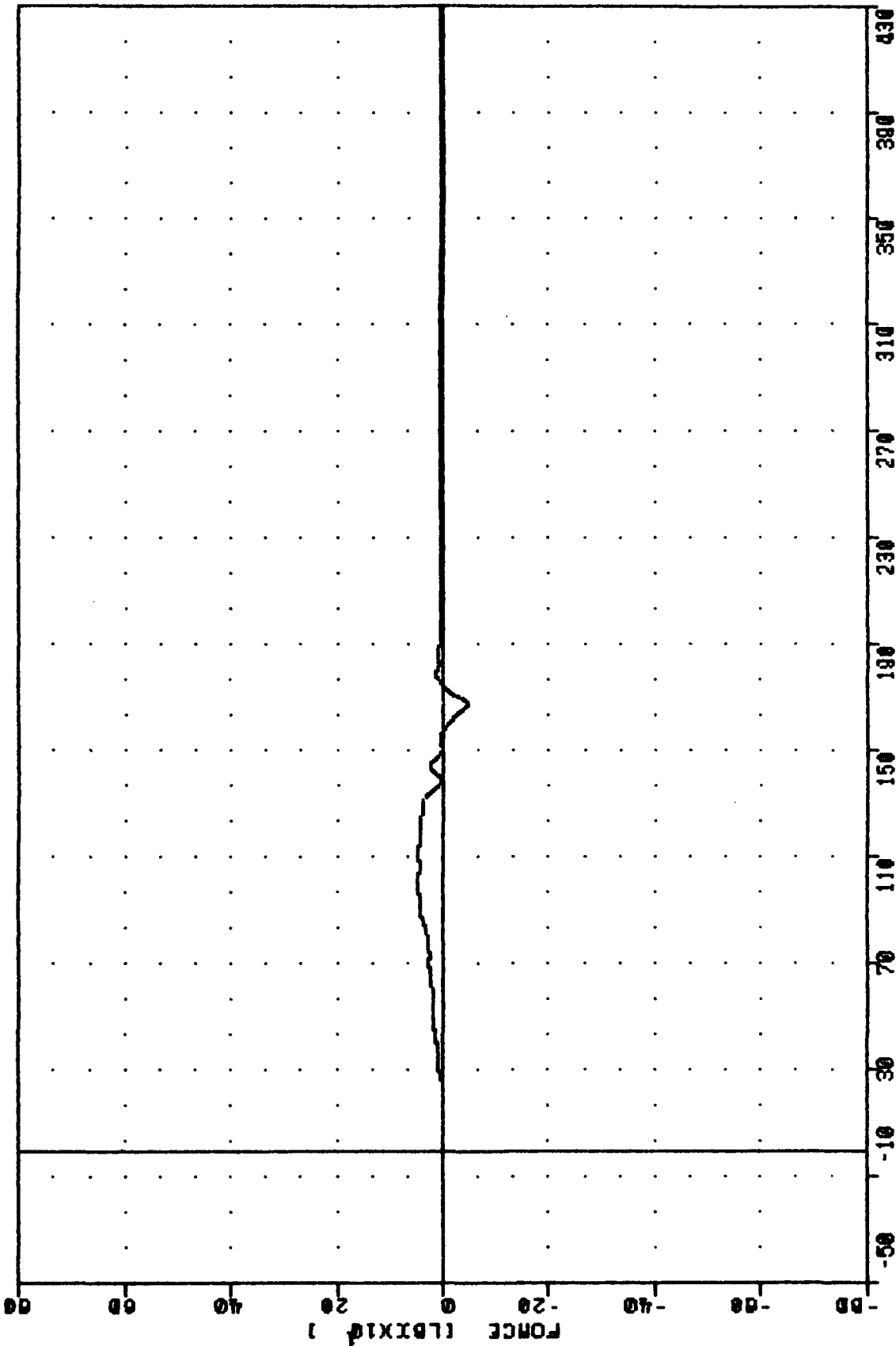


OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 SLED ACCELERATION REDUNDANT

FRA . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 91023 FILTER - 8LPF 100/ 316/ -40
 T1B3 MIN, MAX VALUES : -88.18 307.75, 291.85 204.15

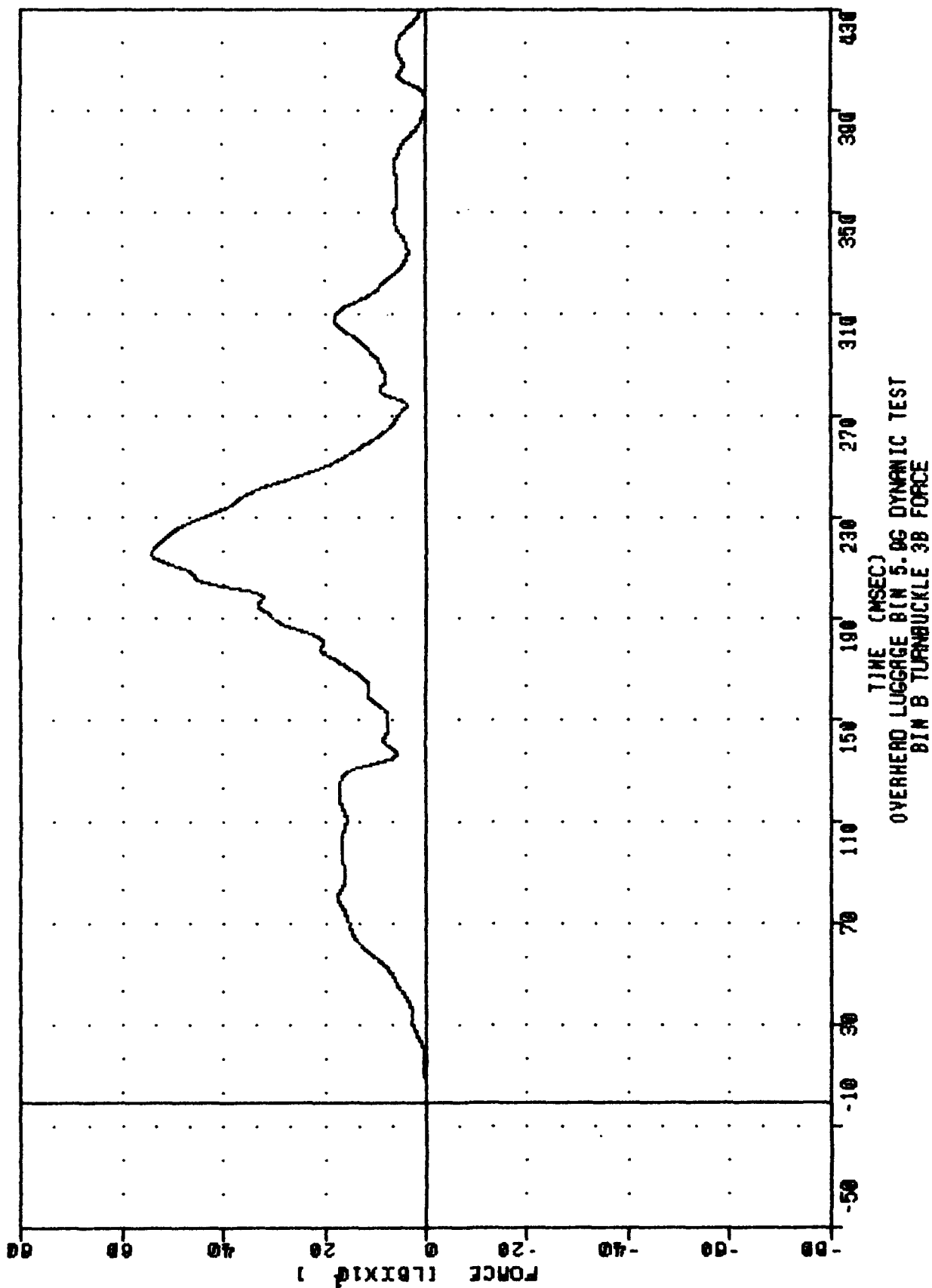


FRA
 91023
 T2B3
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -47.99 167.50 , 40.13 111.50

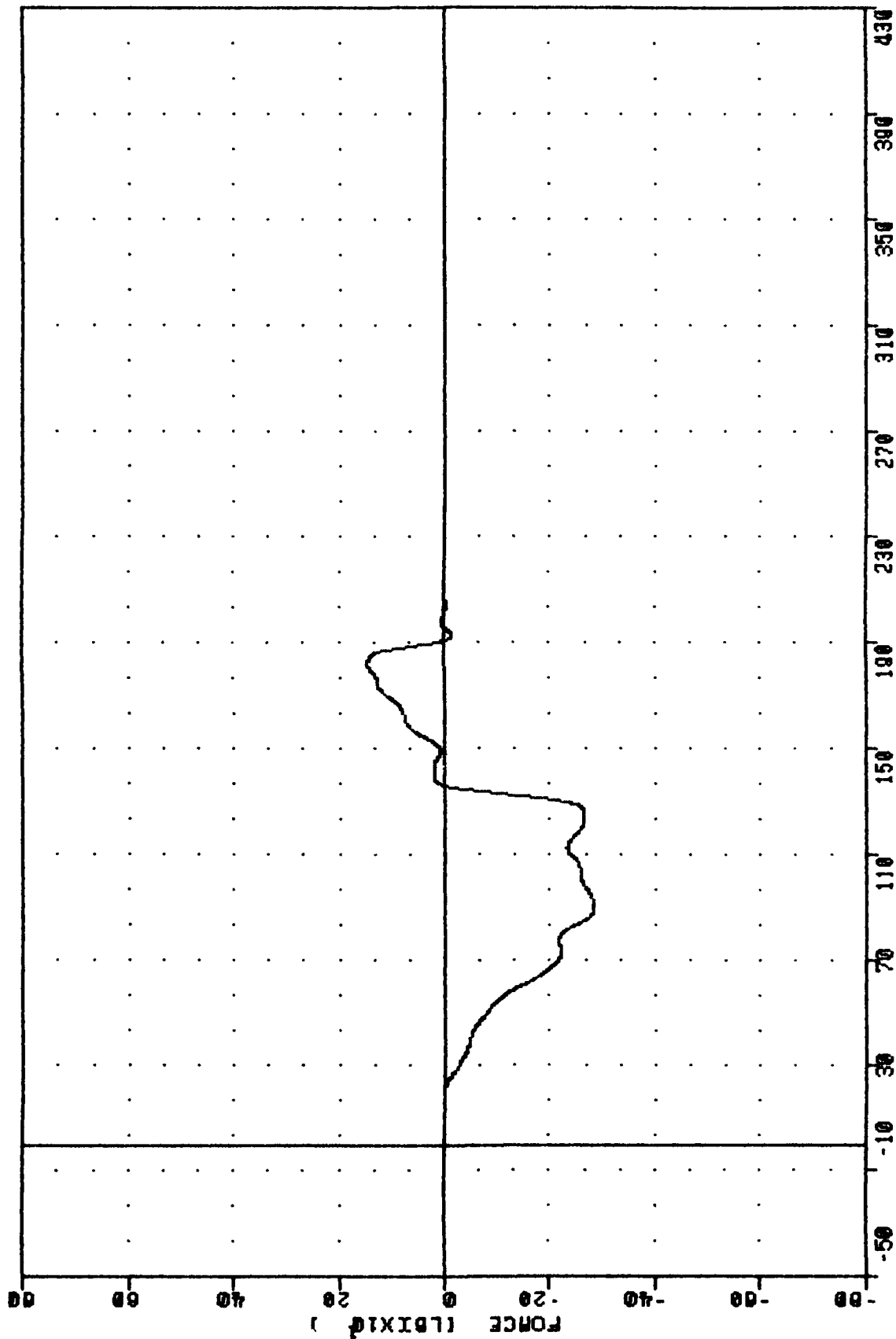


OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 BIN B TURNBUCKLE 28 FORCE

FRA . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 91023 FILTER = BLPF 100/ 316/ -40
 7363 MIN. MAX VALUES = -1.18e -44.50 . 542.16 e 216.00

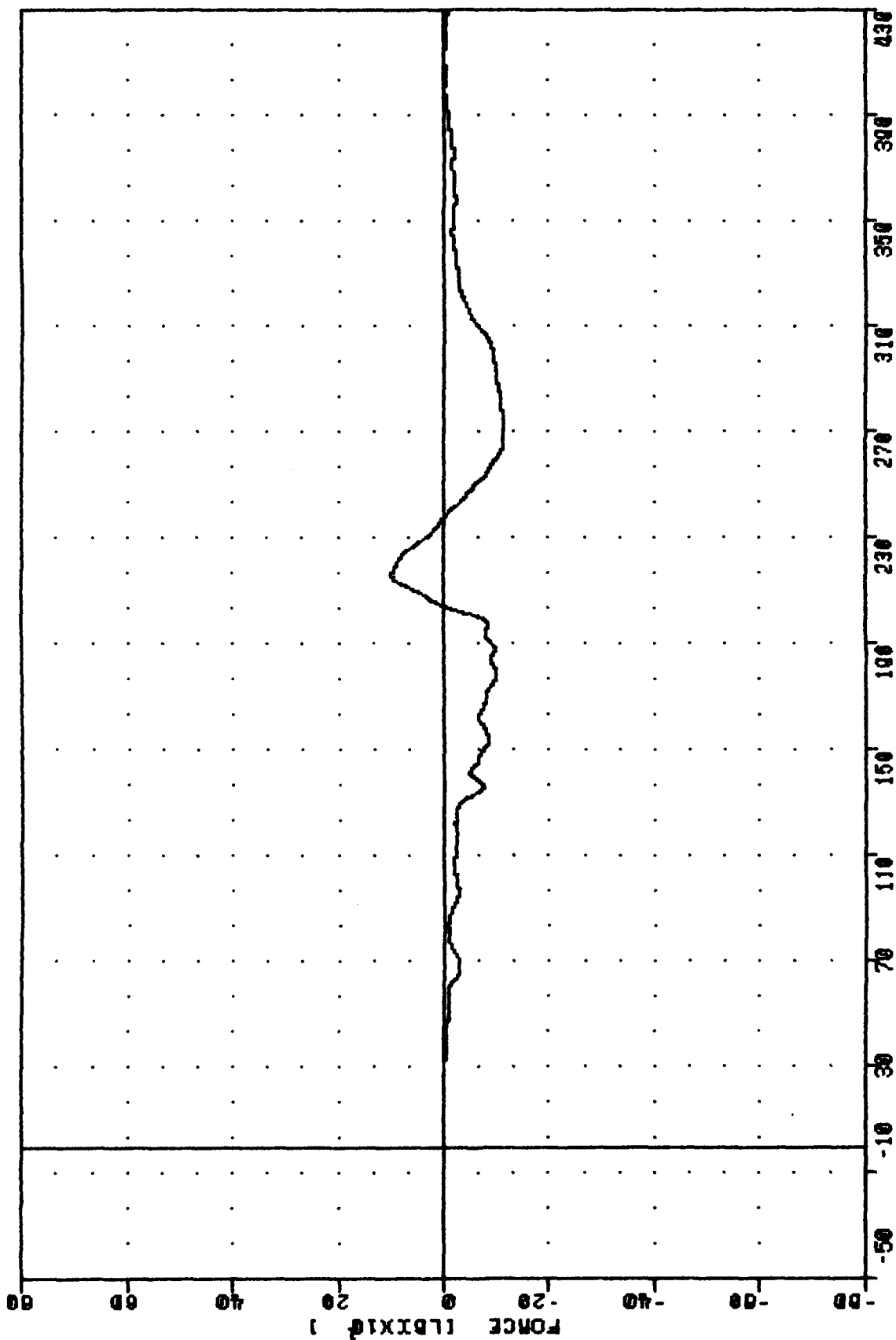


FRA . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 91023 FILTER - 8LPF 100/ 316/ -40
 7483 MIN, MAX VALUES : -284.98 89.63, 144.76 182.13



OVERHEAD LUGGAGE BIN 5.8G DYNAMIC TEST
 BIN B TURNBUCKLE 48 FORCE

FRA 91023
 TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES = -115.01 269.00 , 97.17 216.15



OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 BIN B TURNBUCKLE 58 FORCE

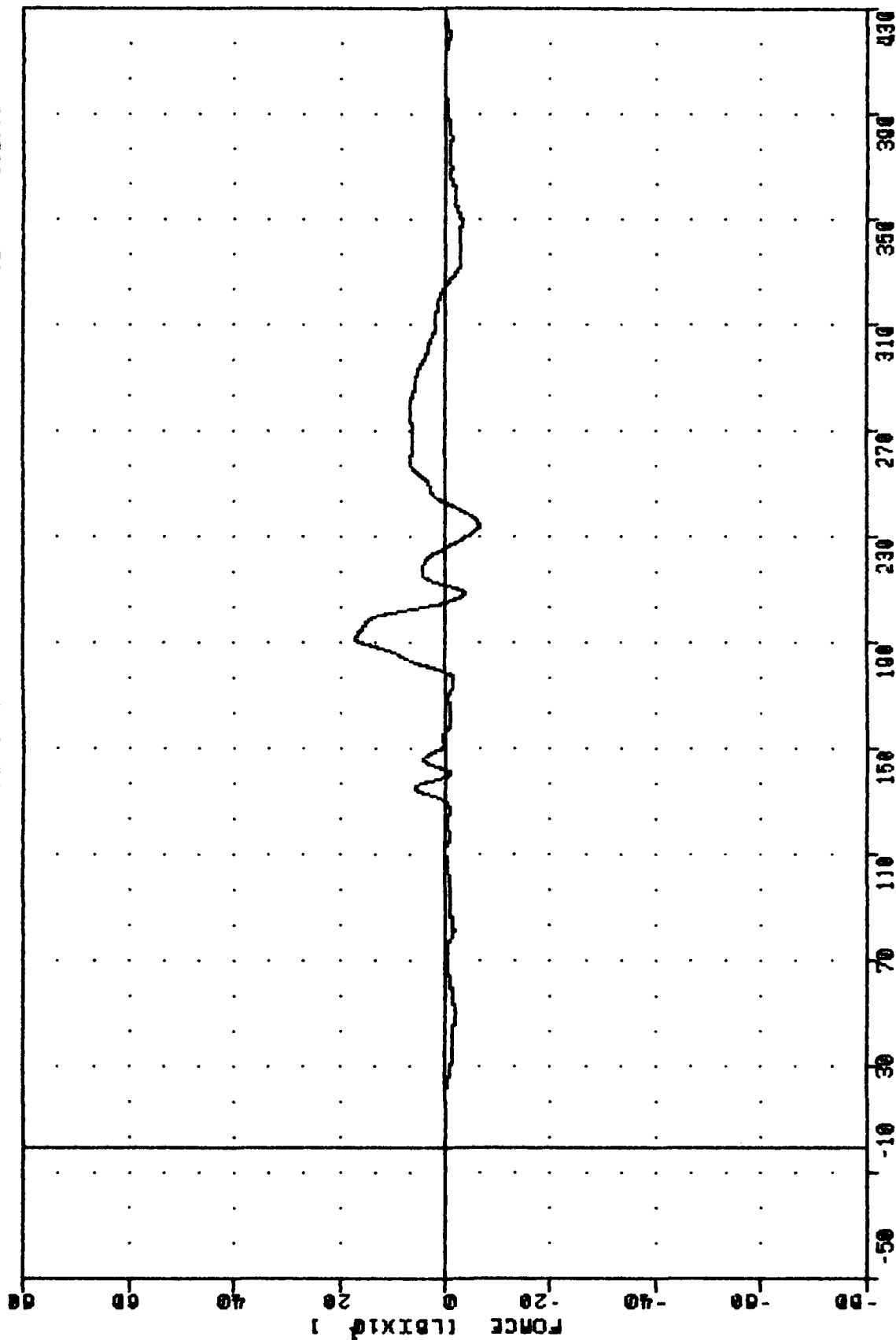
FAR
91023
T003

• TEST 001

• OVERHEAD LUGGAGE BIN TEST

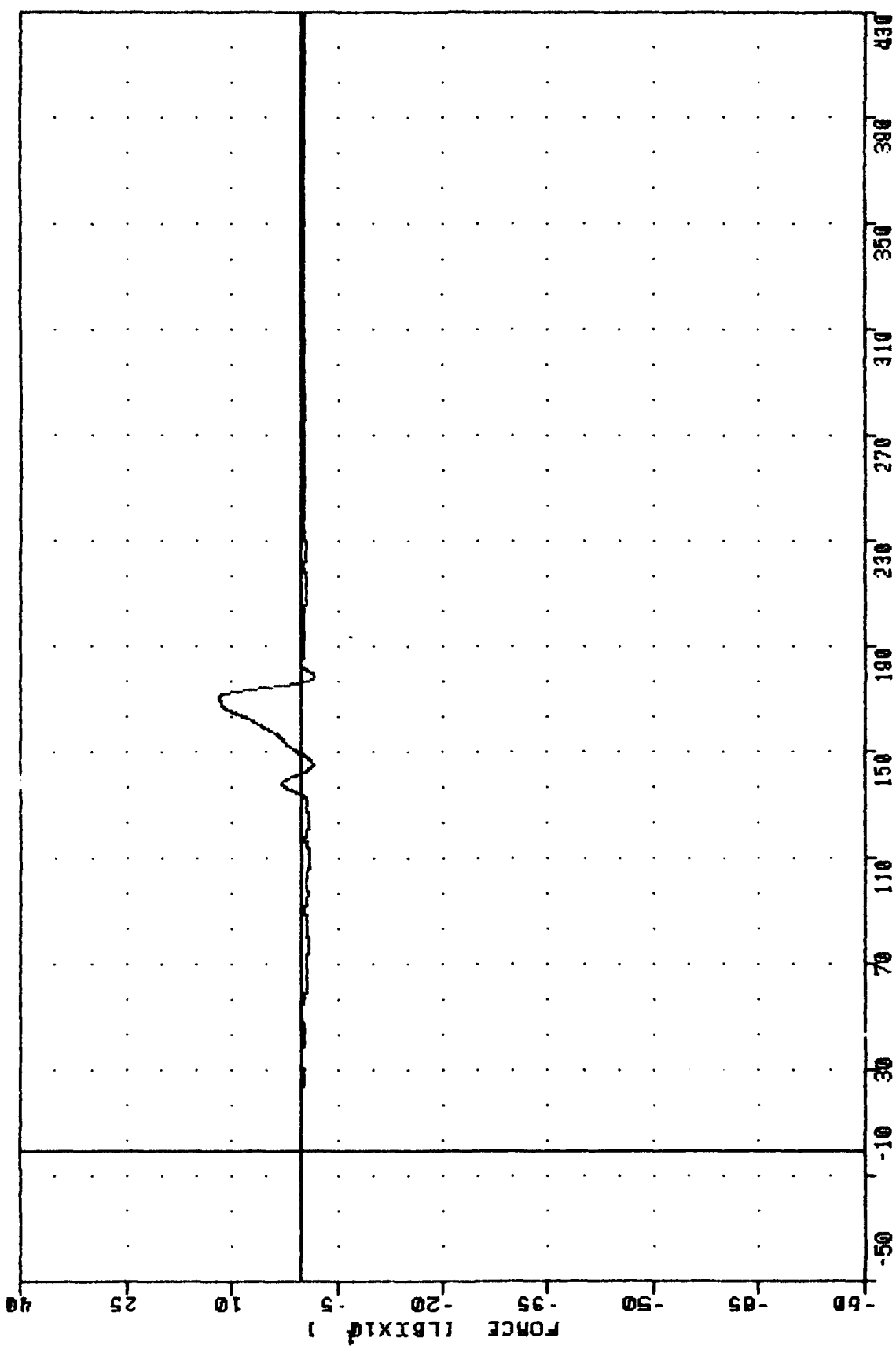
FILTER - BLPF 100/ 316/ -40

MIN, MAX VALUES : -84.59 234.36 103.29 192.00



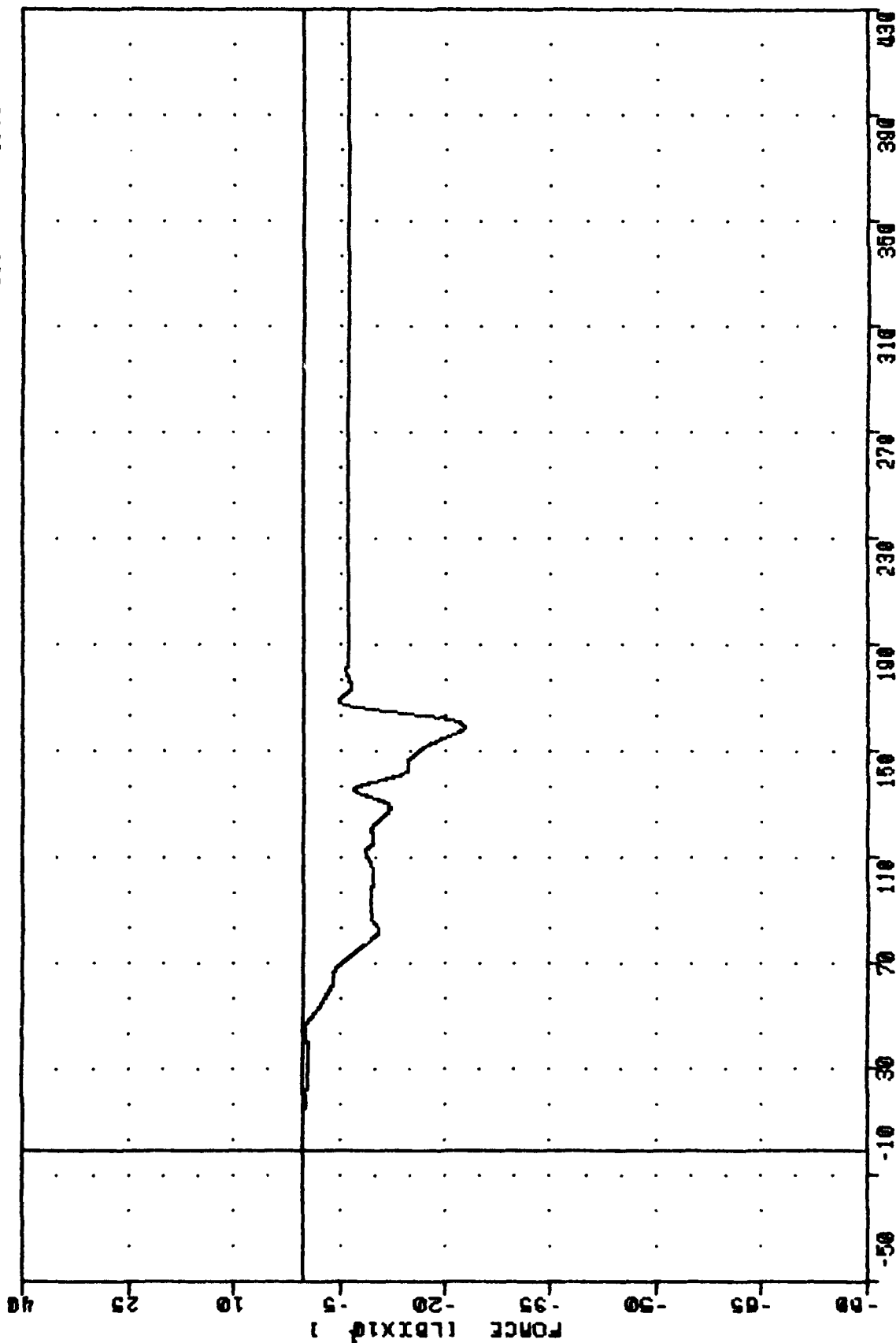
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
BIN B TURNBUCKLE 68 FORCE

FAR
 91023
 T1563
 . TEST 001
 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES = -17.85e 178.63, 118.85 e 170.86



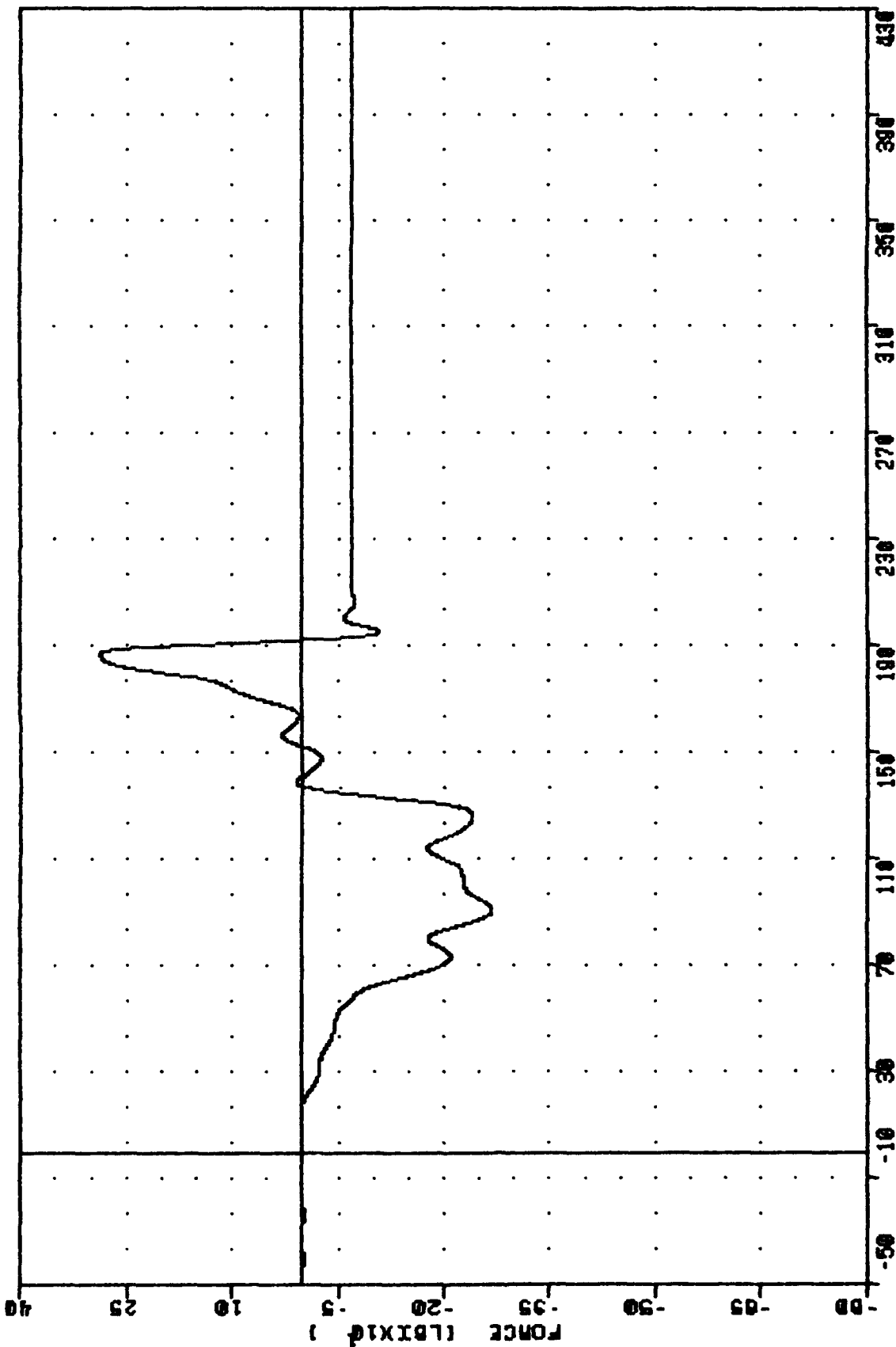
OVERHEAD LUGGAGE BIN 5.8G DYNAMIC TEST
 BIN B TURNBUCKLE 13B FORCE

FRA
 91023
 71403
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -227.42 139.13, 1.38 9.00



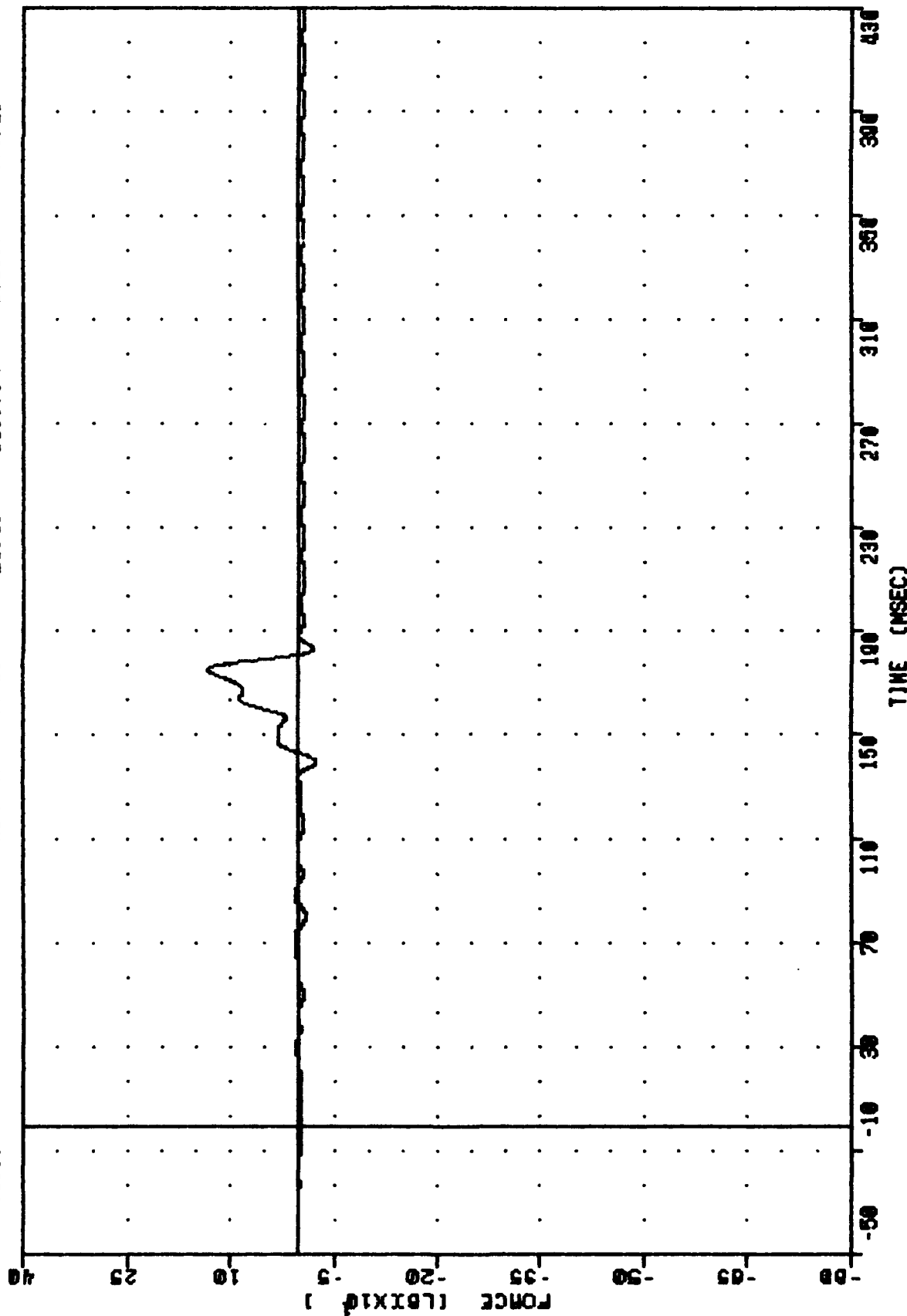
TIME (MSEC)
 OVERHEAD LUGGAGE BIN 5-DG DYNAMIC TEST
 BIN 8 TURNBUCKLE 148 FORCE

FRA 91023 71563 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - 8LPF 100/ 316/ -40
 MIN, MAX VALUES : -268.40 90.75, 268.80 187.88



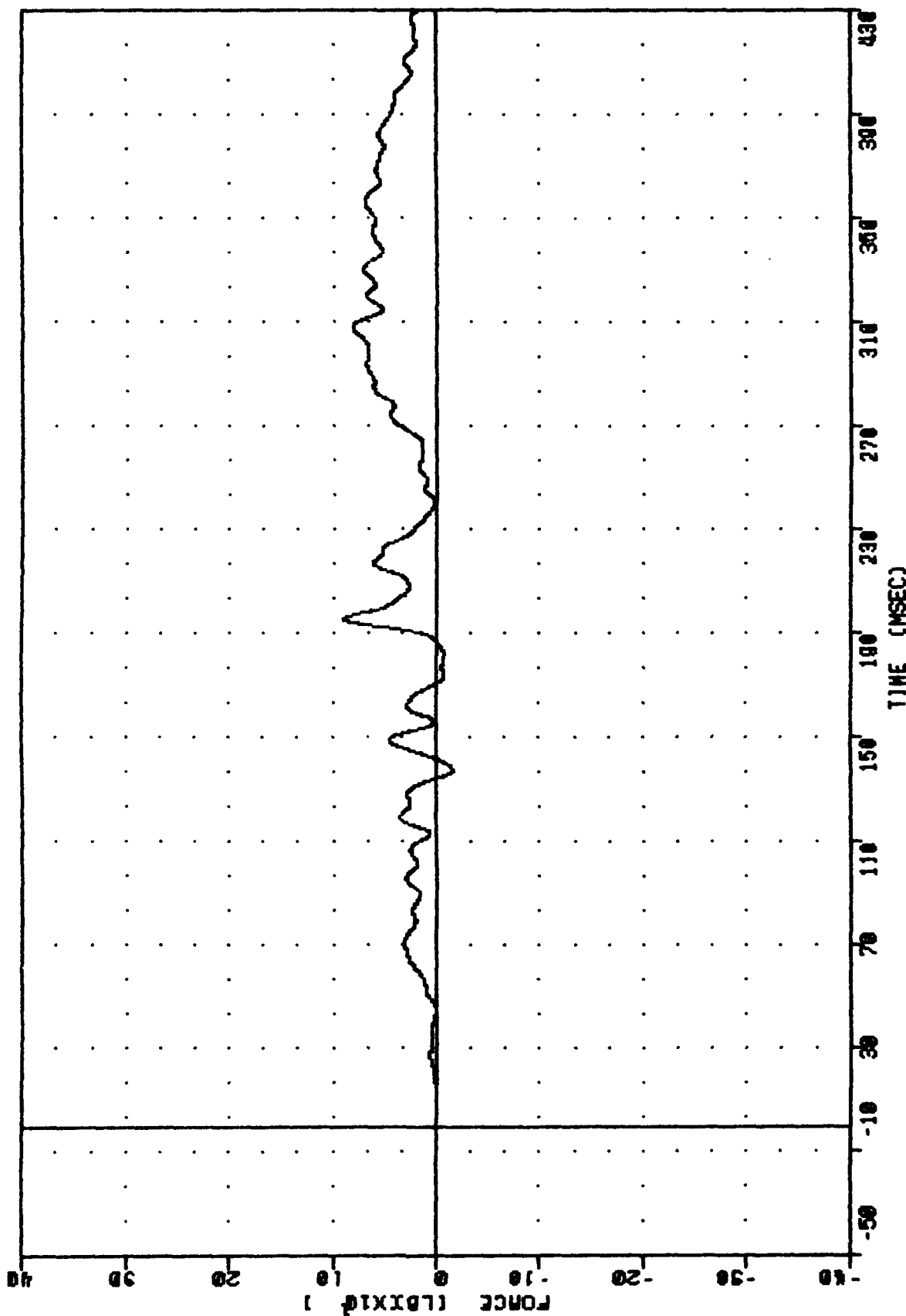
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 BIN 8 TURNBUCKLE 158 FORCE

FRA 91023 T1663 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -23.40 139.75, 131.05 175.23



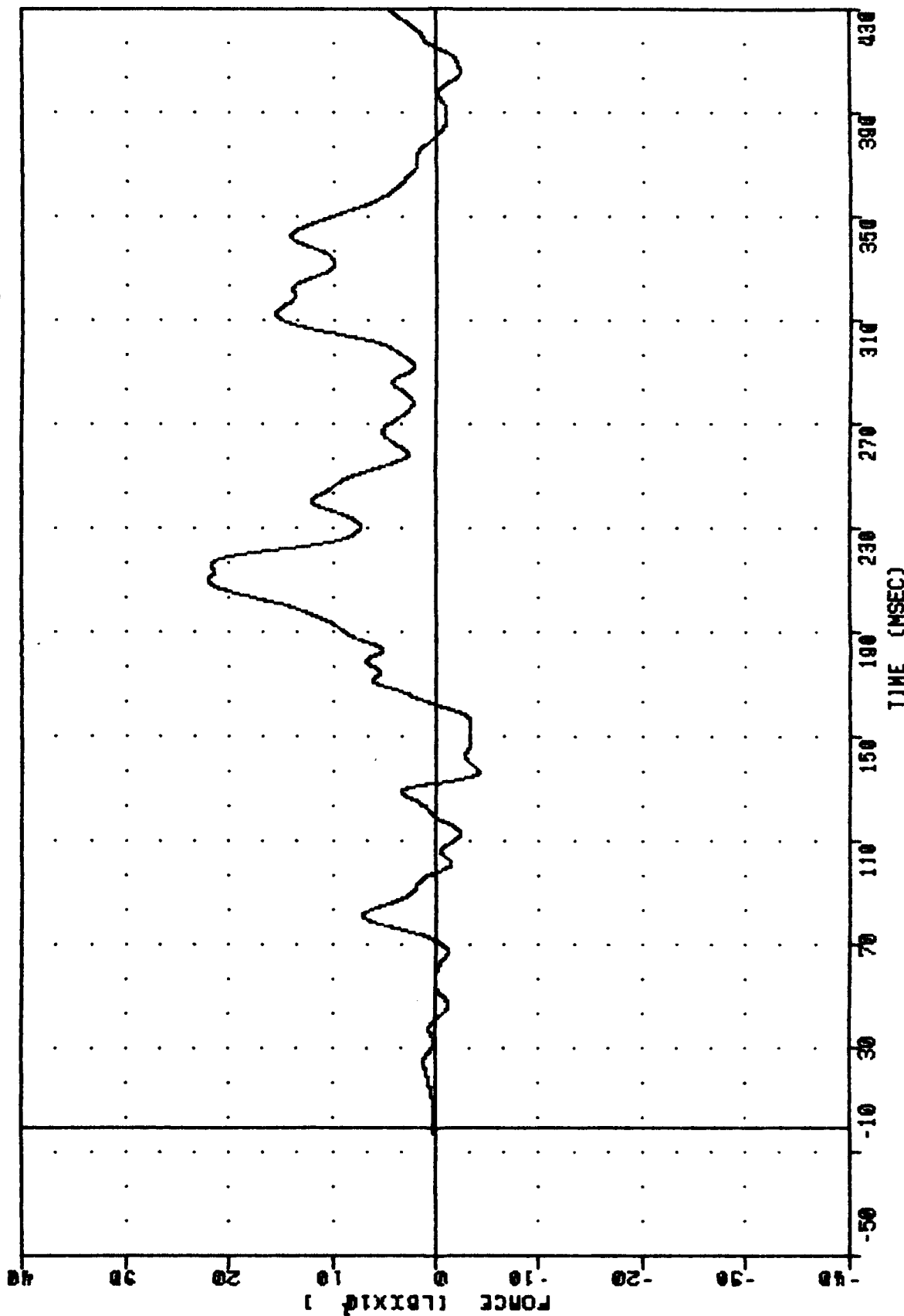
OVERHEAD LUGGAGE BIN 5. DG DYNAMIC TEST
 BIN B TURNBUCKLE 168 FORCE

FRA
 91023
 T2183
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -15.77e 137.63, 89.13 e 195.63



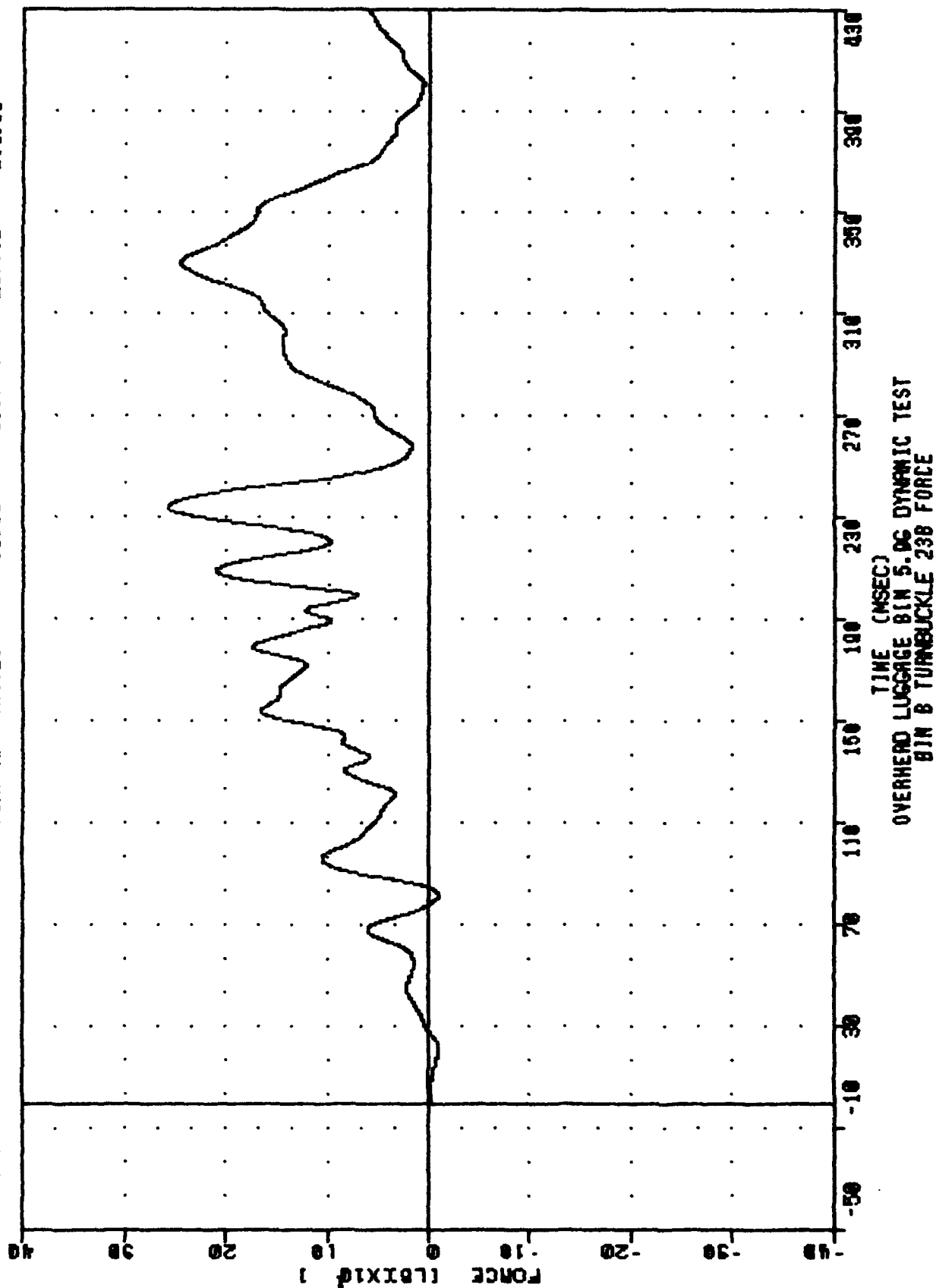
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 BIN 8 TURNBUCKLE 218 FORCE

FRA 91023 72203 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER = 8LPG 100/ 316/ -40
 MIN, MAX VALUES = -41.39 136.75, 219.62 209.00

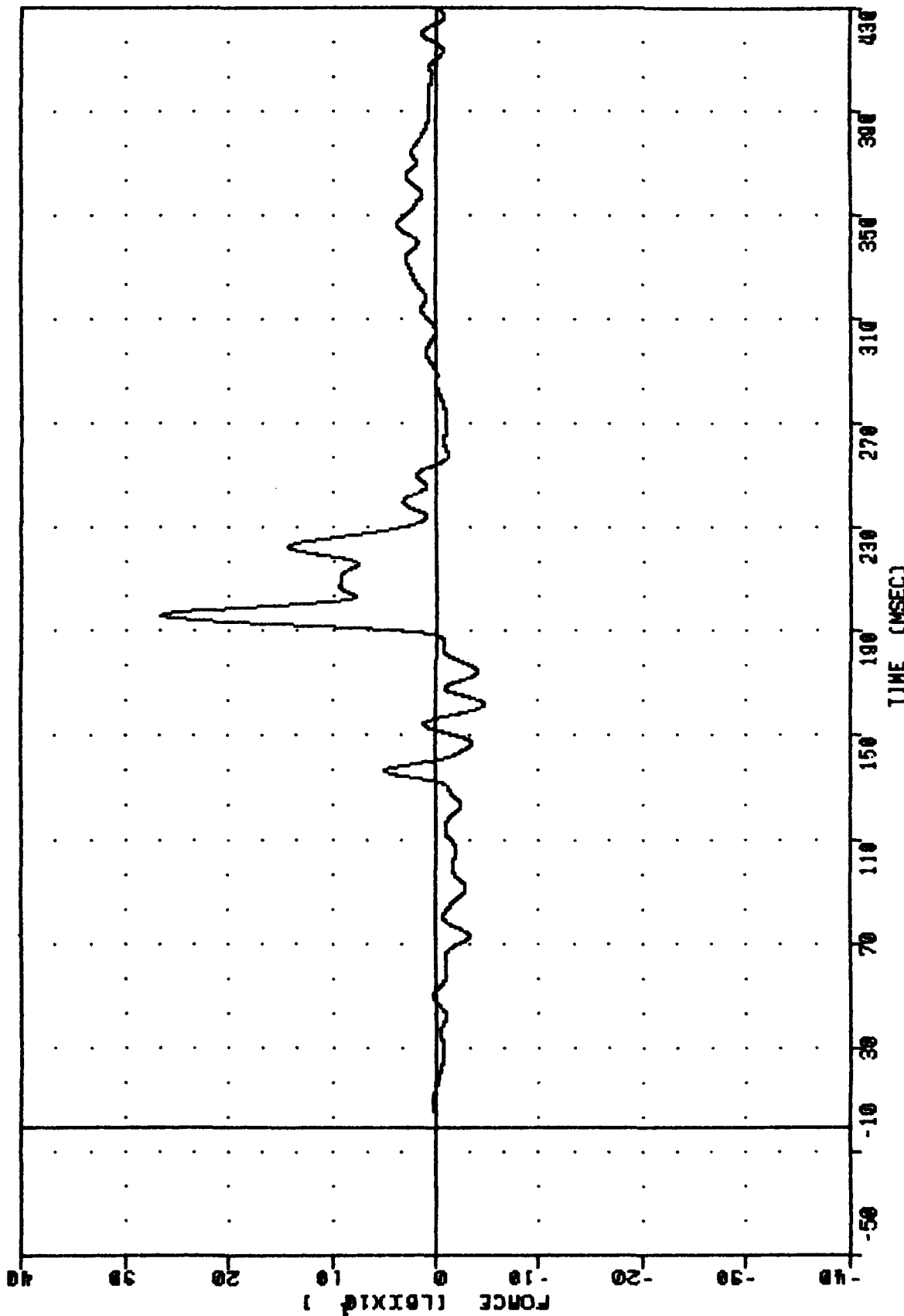


OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 BIN 8 TURNBUCKLE 228 FORCE

FRA . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 91023 FILTER - BLPF 100/ 316/ -40
 12585 MIN. MAX VALUES : -10.10e 81.75, 237.92 e 234.00

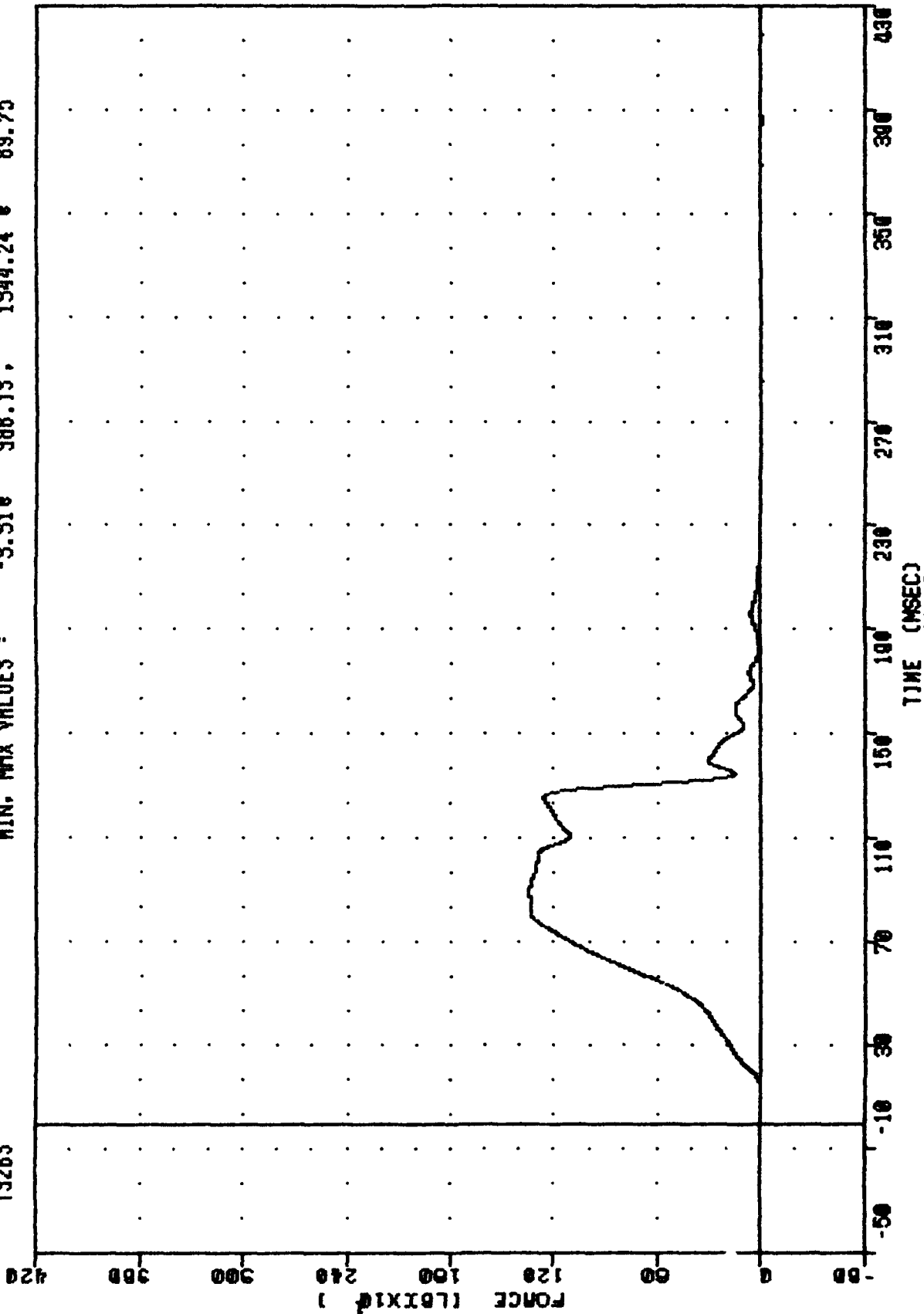


FAR 91023 72483
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100 / 316 / -40
 MIN, MAX VALUES : -40.84 102.00 , 203.73 196.00



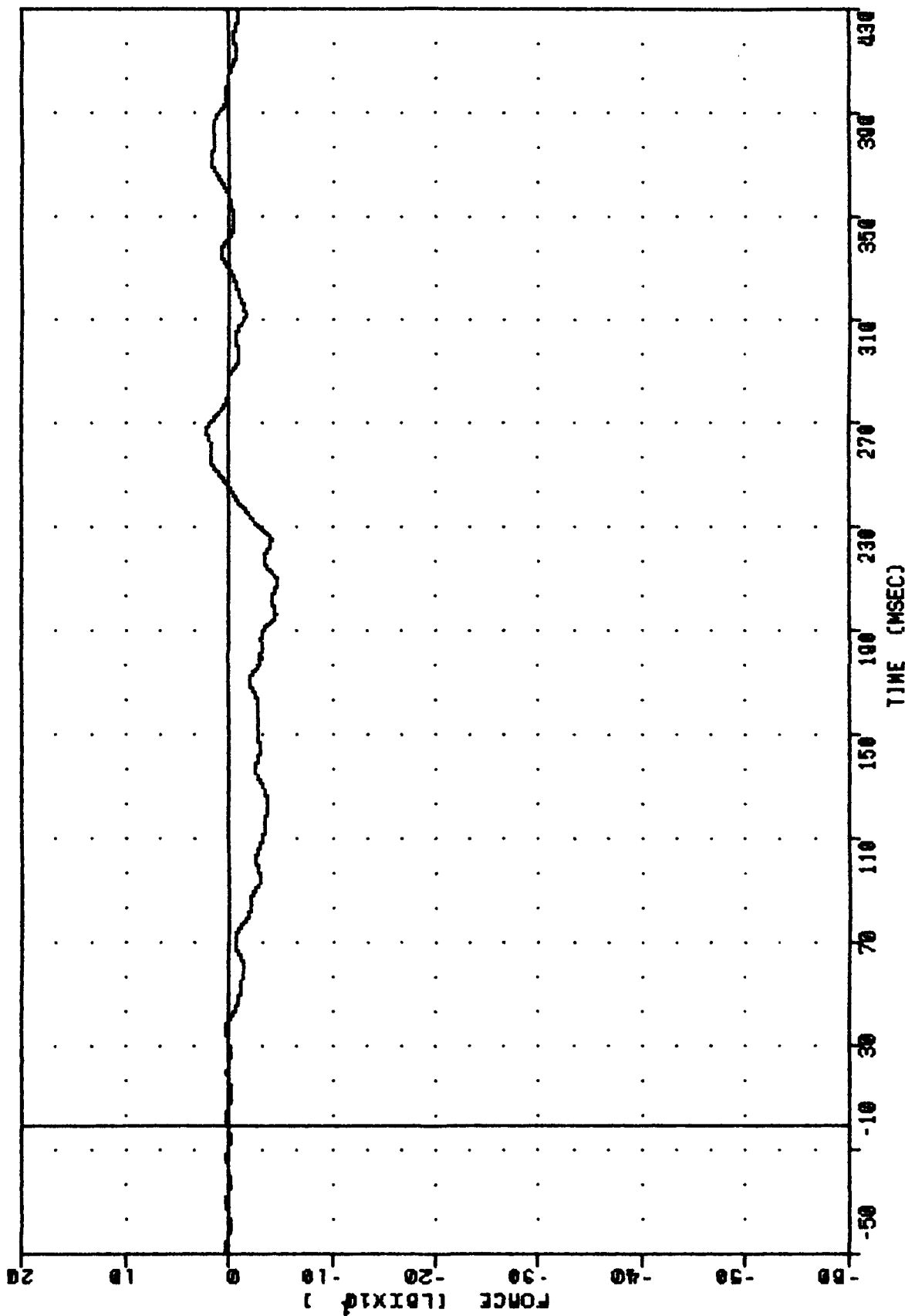
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 BIN B TURNBUCKLE 248 FORCE

FRR
 91023
 T3283
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -9.51e 388.13 . 1944.24 e 89.75



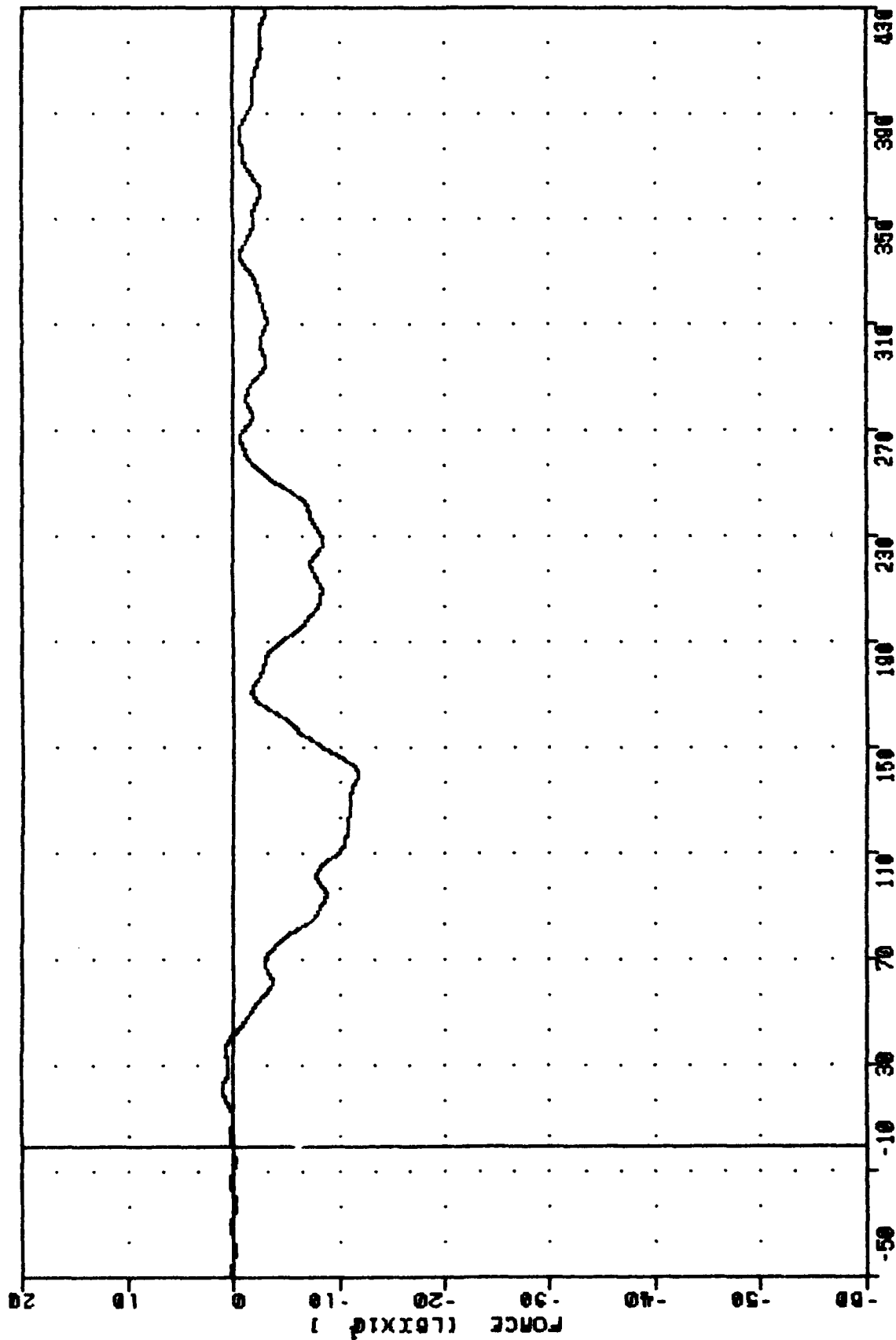
OVERHEAD LUGGAGE BIN 5.DG DYNAMIC TEST
 BIN B TURNBUCKLE 328 FORCE

FRA . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 91023 FILTER = 8L PF 100/ 316/ -40
 T3H3 MIN. MAX VALUES : -47.74e 288.88 , 21.11 e 267.00



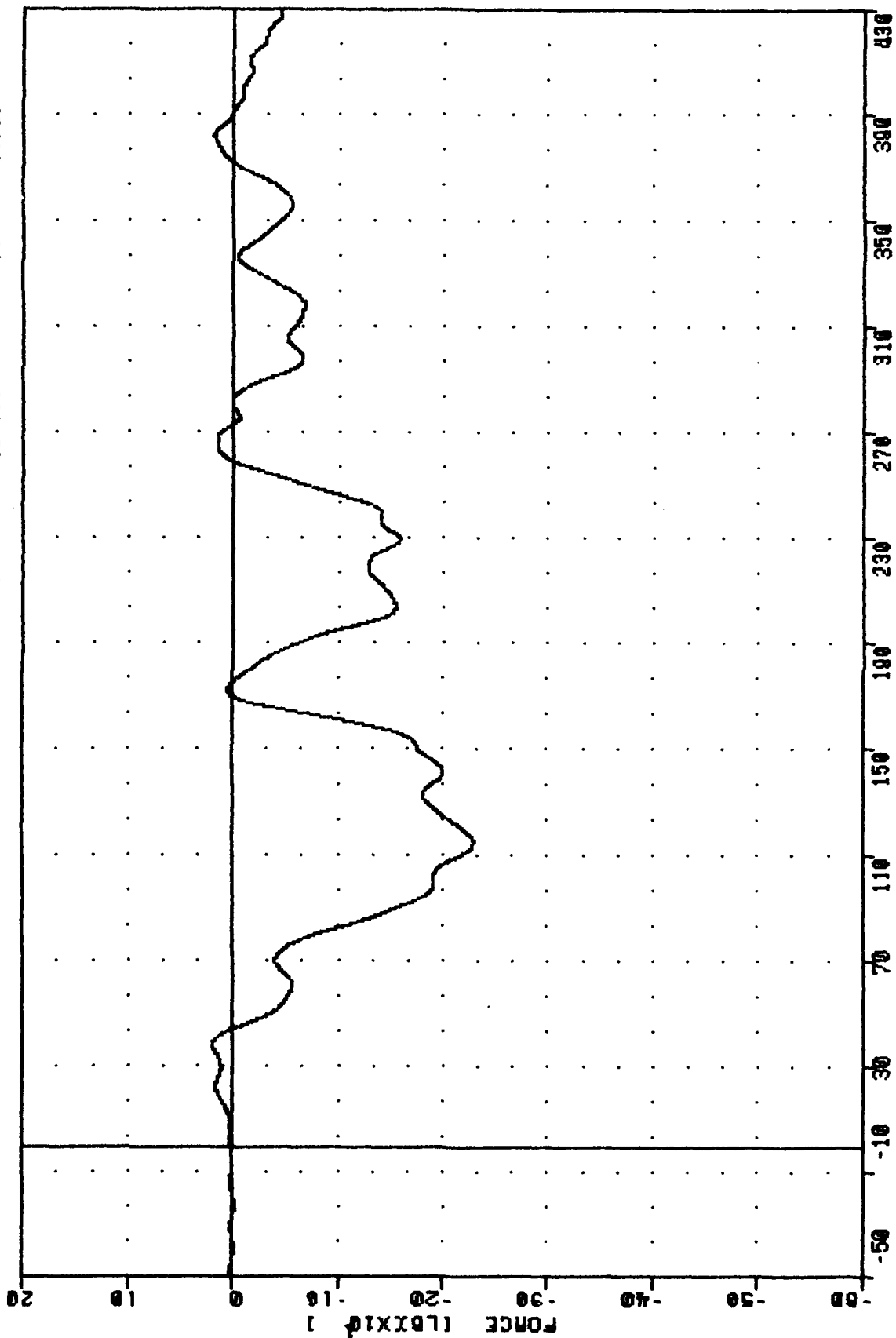
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 BIN A TURNBUCKLE 3H FORCE

FRA 91023
 T4HS
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -117.07e 140.13e 10.14e 21.00



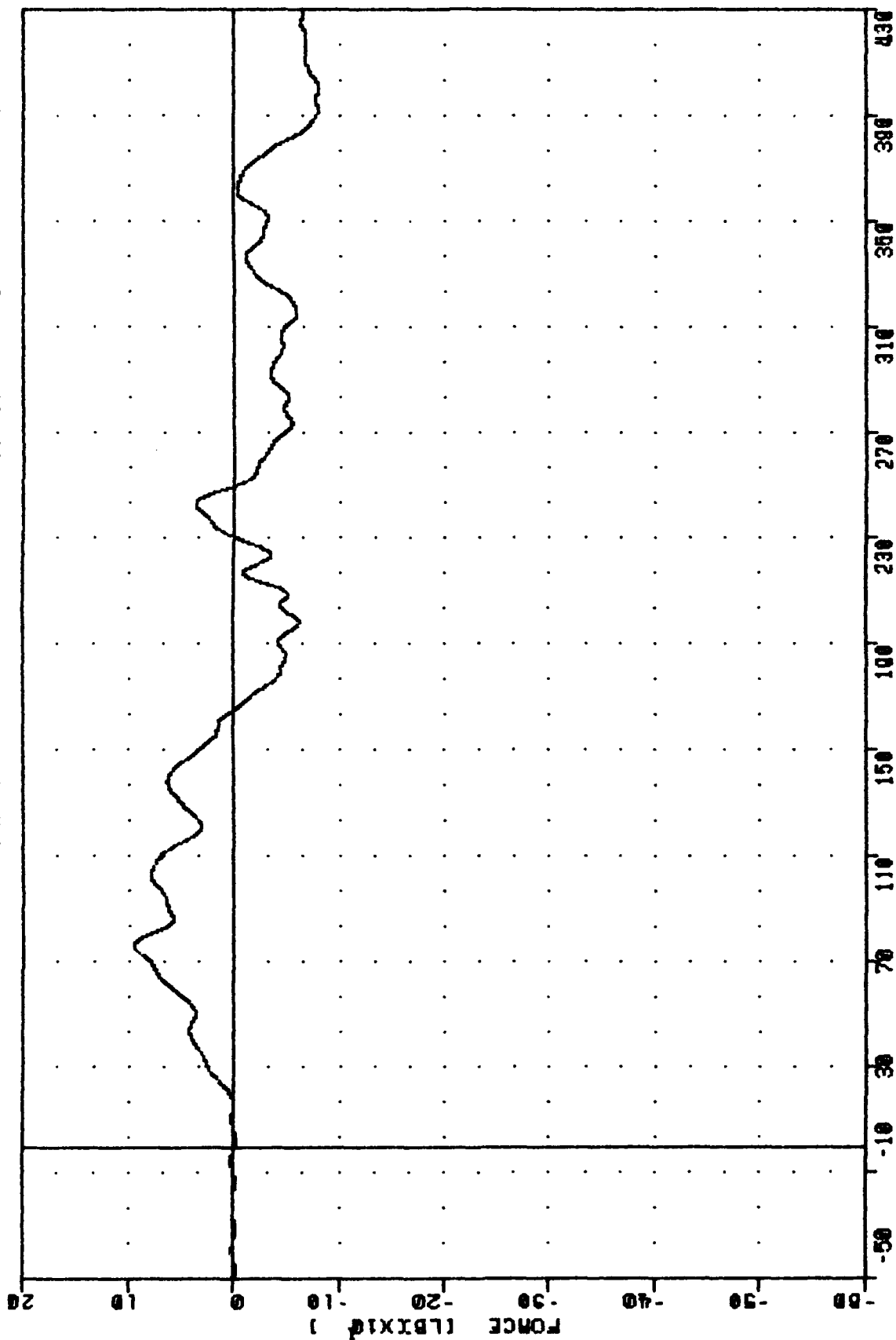
TIME (MSEC)
 OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 BIN A TURNBUCKLE 4H FORCE

FRR 91023 TMS
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -229.57 115.00 . 18.78 36.25



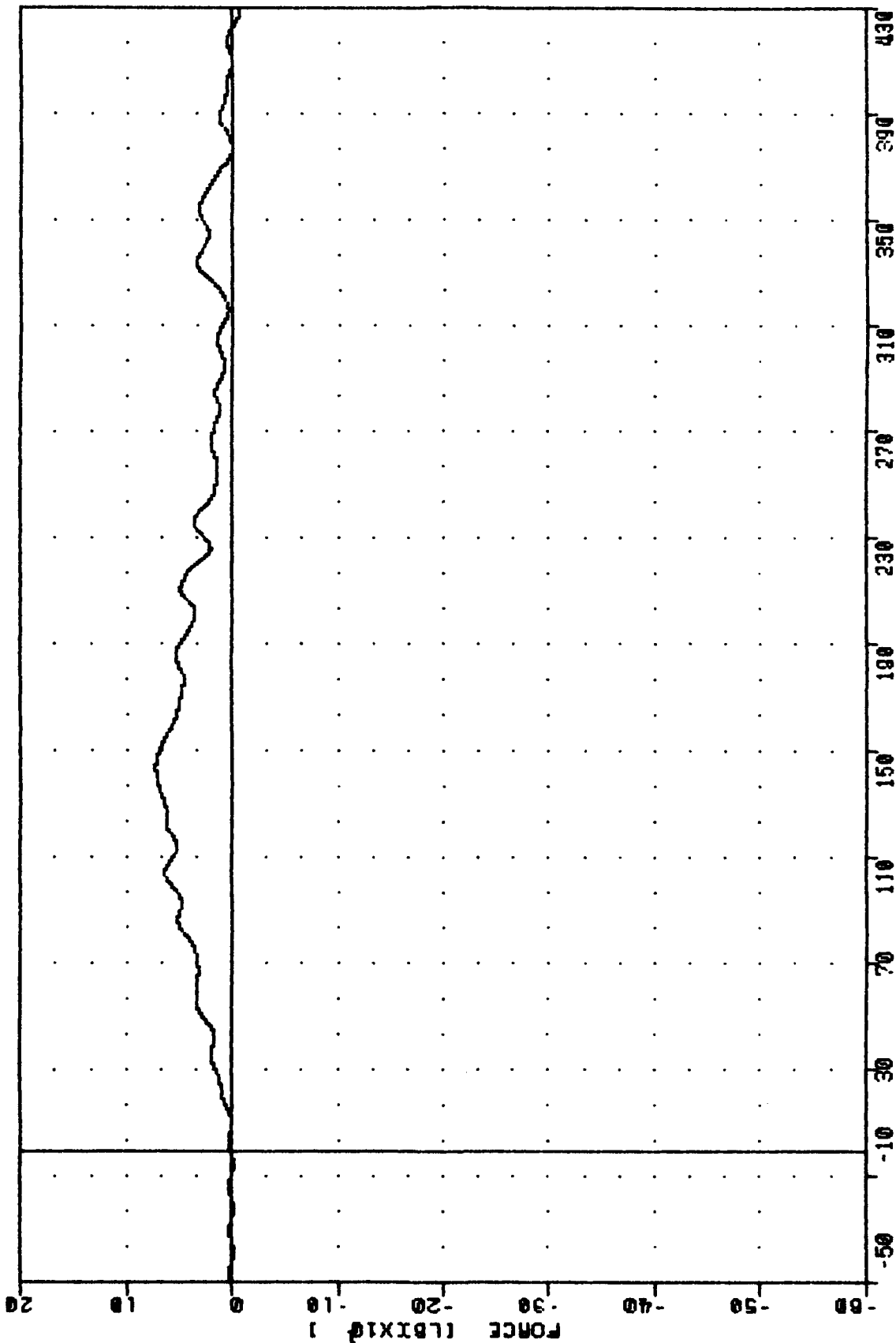
TIME (MSEC)
 OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 BIN A TURBUCKLE 5H FORCE

FAA
 91023
 TONS
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - 8LPF 100/ 316/ -40
 MIN. MAX VALUES : -80.59e 400.50 , 93.16 e 76.23



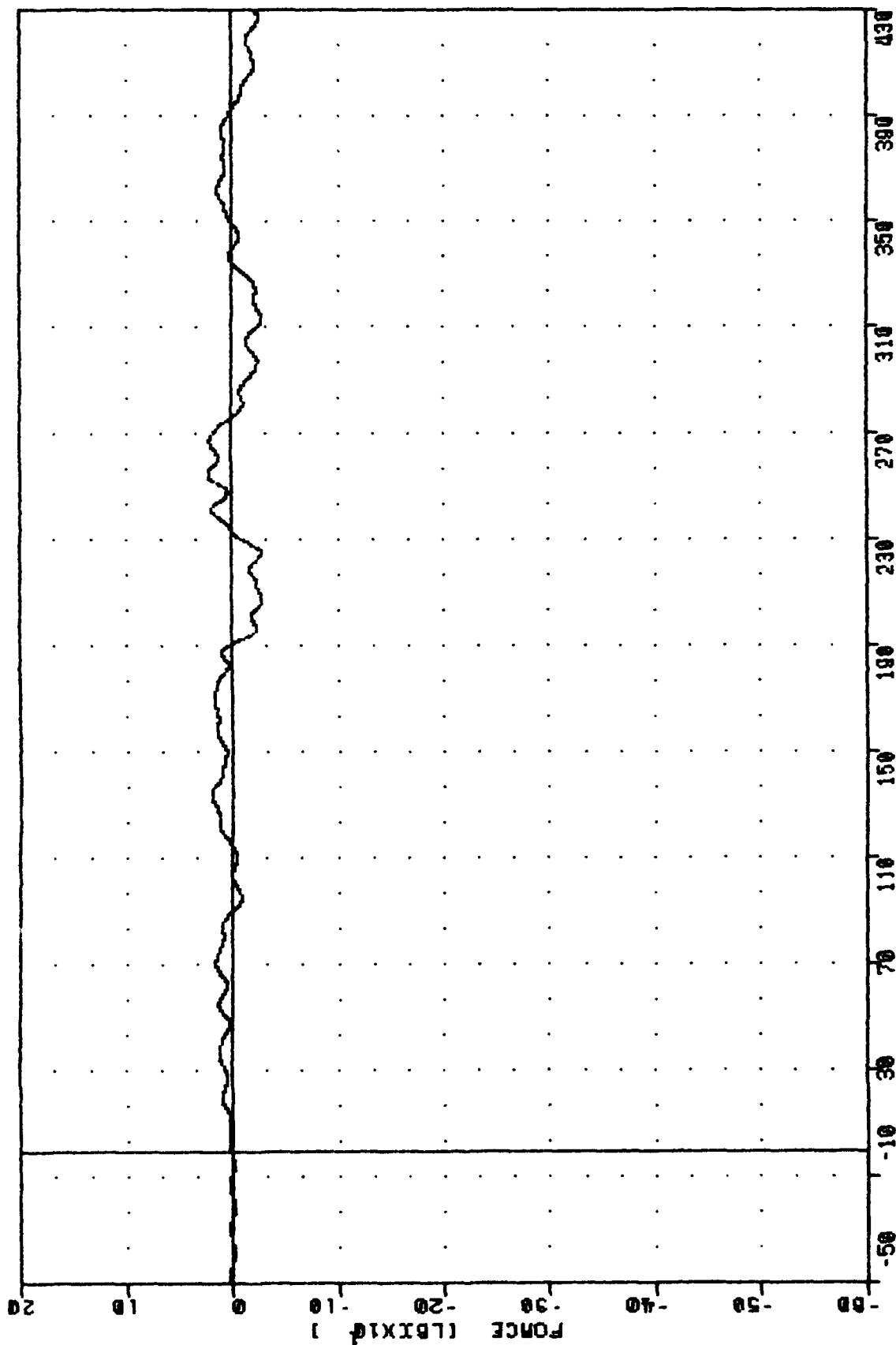
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 BIN A TURNBUCKLE 6H FORCE

FRA . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 91023 FILTER - BLPF 100/ 316/ -40
 T7H3 MIN. MAX VALUES : -6.62 428.38 , 72.33 143.58



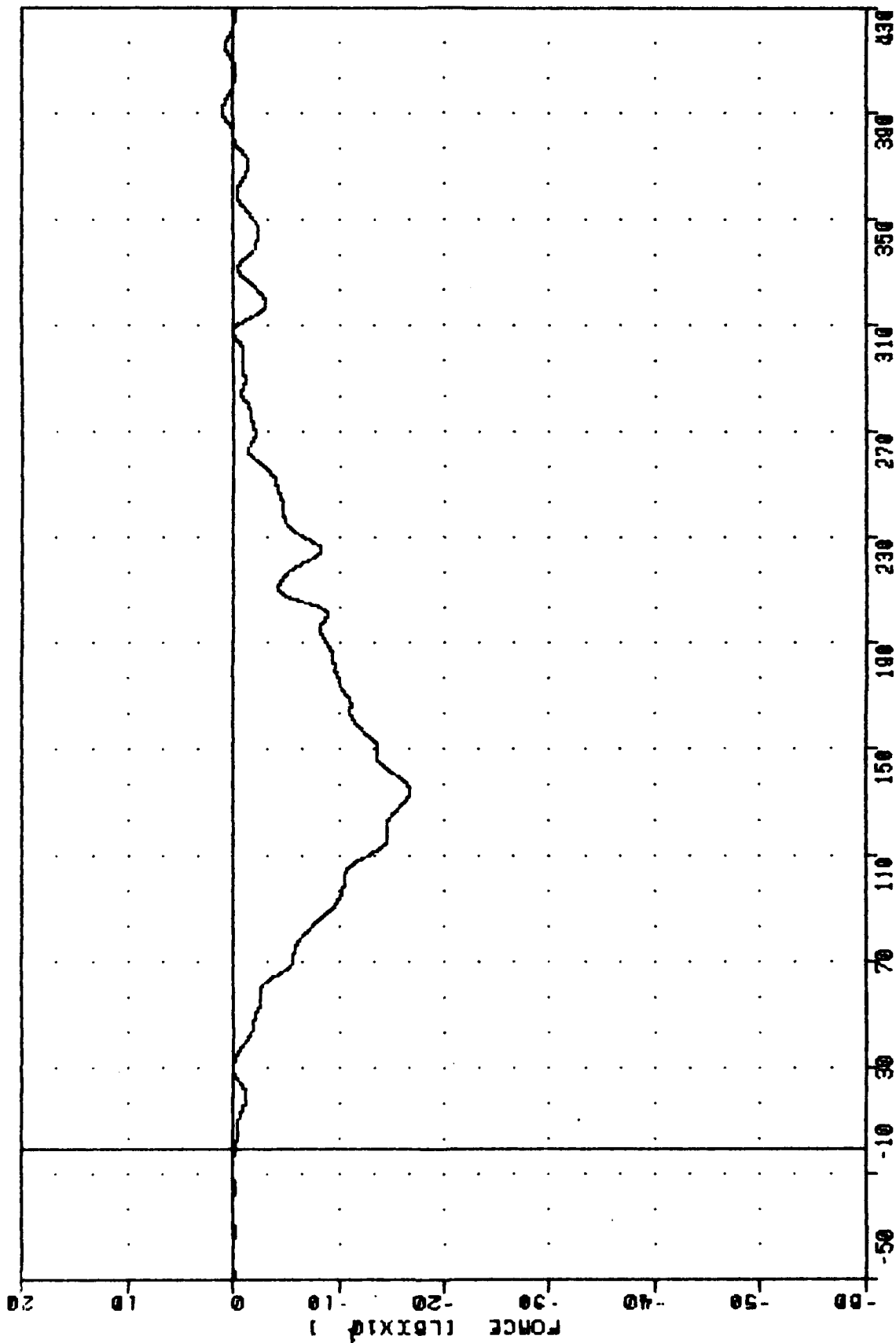
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 BIN A TURNBUCKLE 7H FORCE

FRA . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 91023 FILTER - BLPF 100/ 316/ -40
 T8H3 MIN, MAX VALUES : -28.84e 207.50 , 22.49 e 254.75



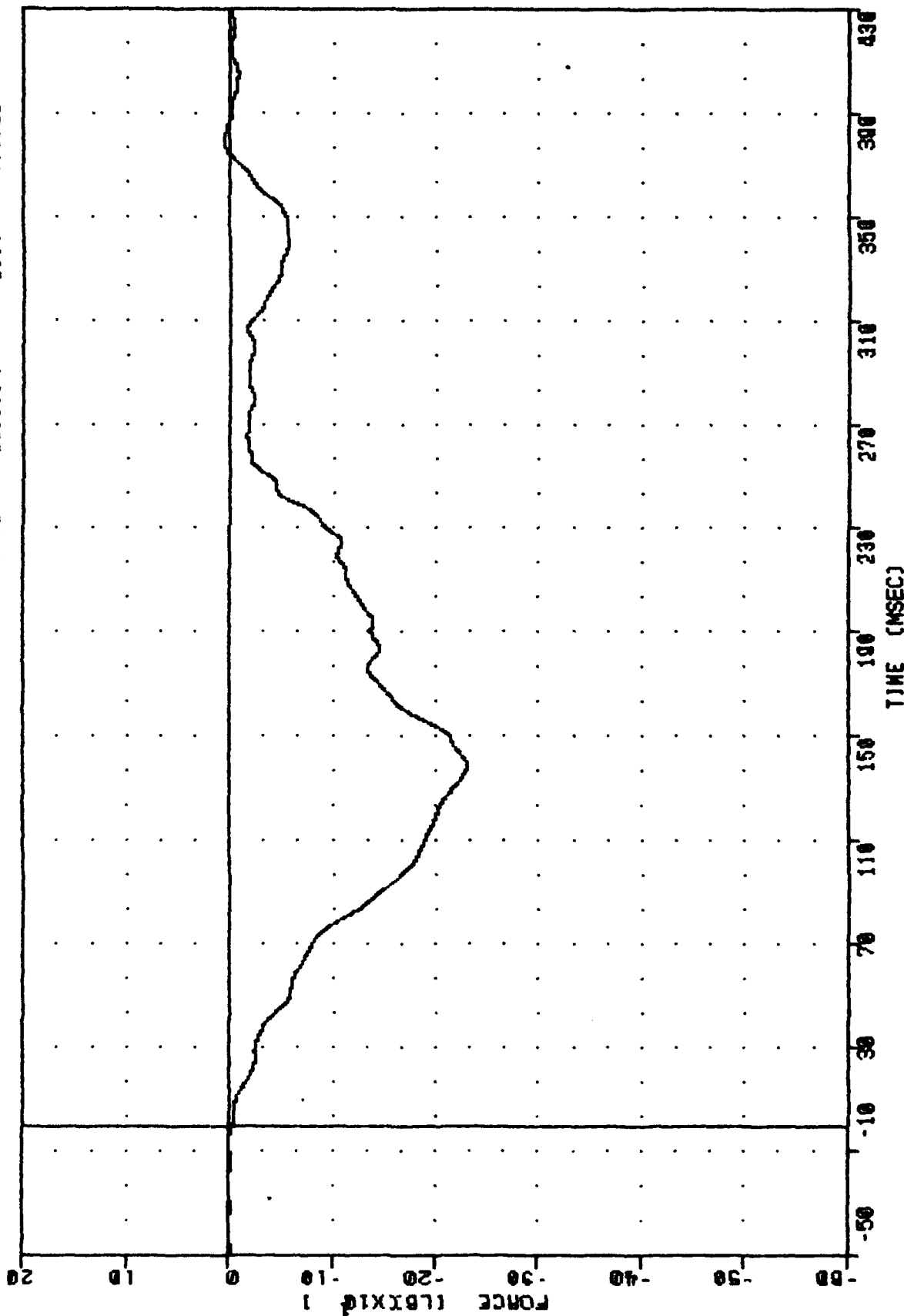
TIME (MSEC)
 OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 BIN A TURNBUCKLE 8H FORCE

FAR 91023 TMS
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -167.71e 133.88 , 10.05 e 390.83



TIME (MSEC)
 OVERHEAD LUGGAGE BIN 5. DG DYNAMIC TEST
 BIN A TURNBUCKLE 9H FORCE

FAA . TEST 0001 . OVERHEAD LUGGAGE BIN TEST
 91023 FILTER - BLPF 100/ 316/ -40
 710HS MIN, MAX VALUES : -230.88 138.50 , 3.34 379.25



OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 BIN A TURNBUCKLE 10H FORCE

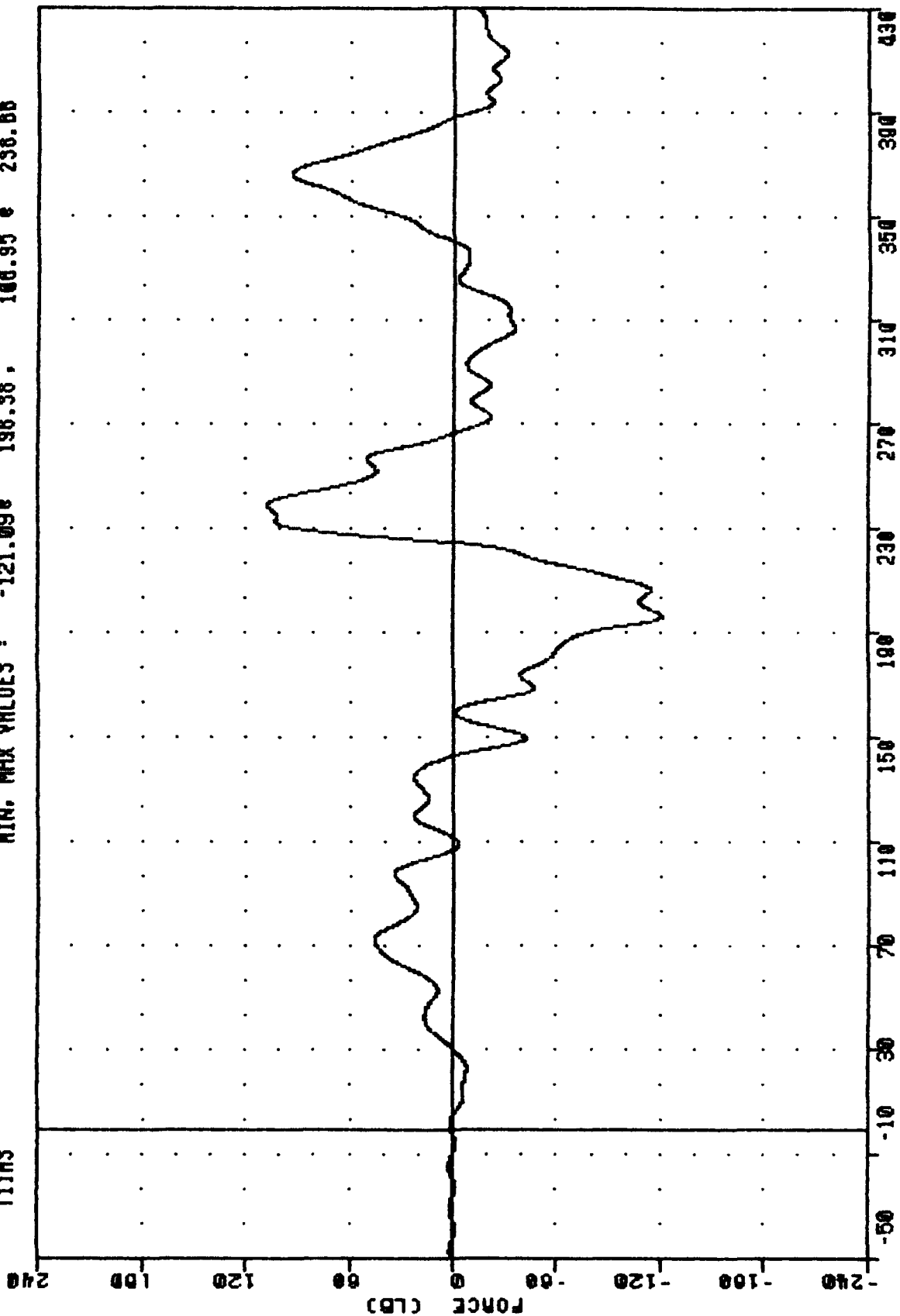
FAR
91023
T11HS

. TEST 001

. OVERHEAD LUGGAGE BIN TEST

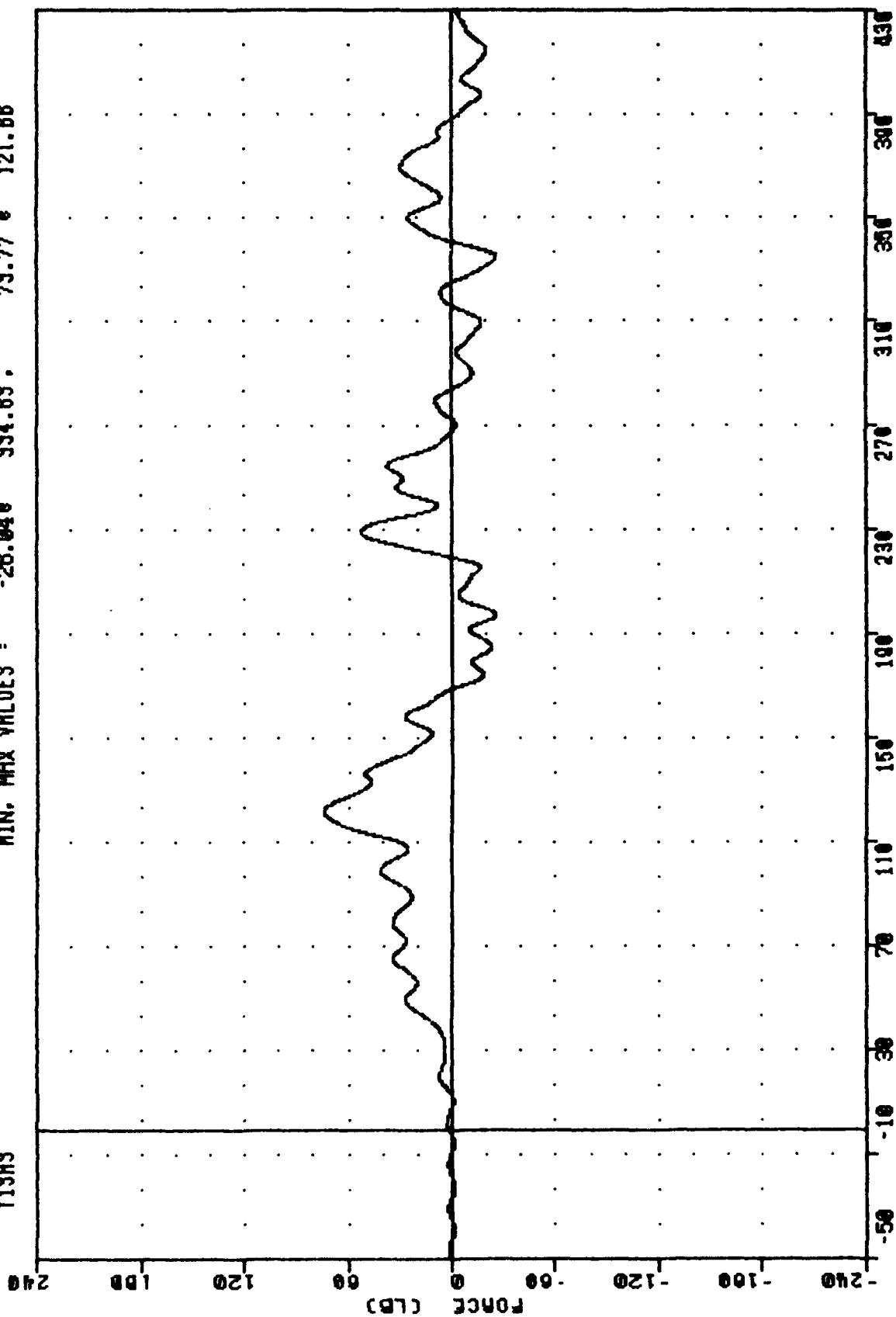
FILTER - BLPF 100/ 316/ -40

MIN. MAX VALUES : -121.09 196.36 100.95 236.86



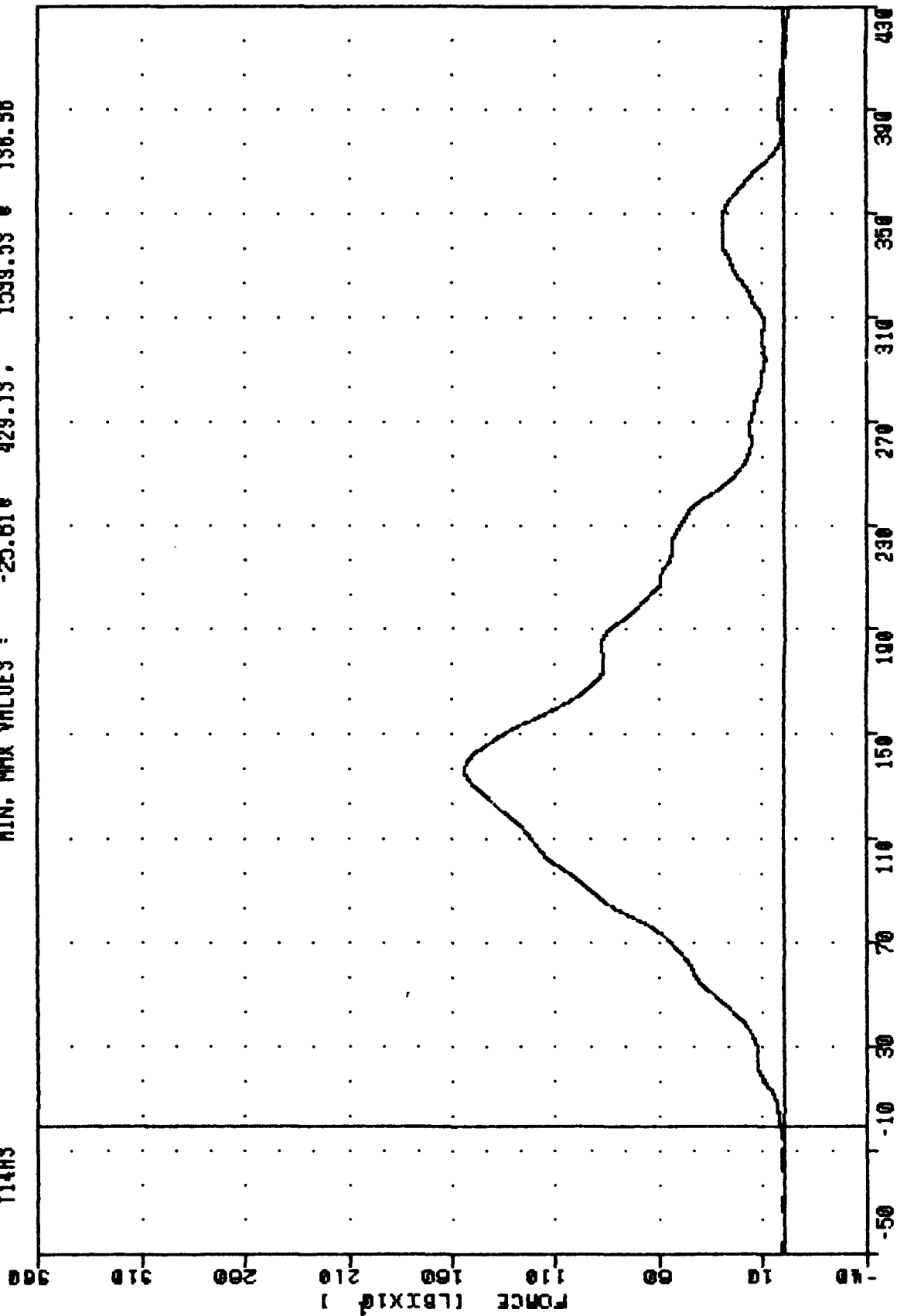
TIME (MSEC)
OVERHEAD LUGGAGE BIN 5.8G DYNAMIC TEST
BIN A TURNBUCKLE 11H FORCE

FRA . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 91023 FILTER - 8LPP 100/ 316/ -40
 713HS MIN, MAX VALUES : -26.040 334.63. 73.77 121.88



TIME (MSEC)
 OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 BIN A TURNBUCKLE 13H FORCE

FRA
 91023
 T14H3
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -25.01e 429.13 . 1539.53 e 190.90



OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 BIN A TURNBUCKLE 14H FORCE

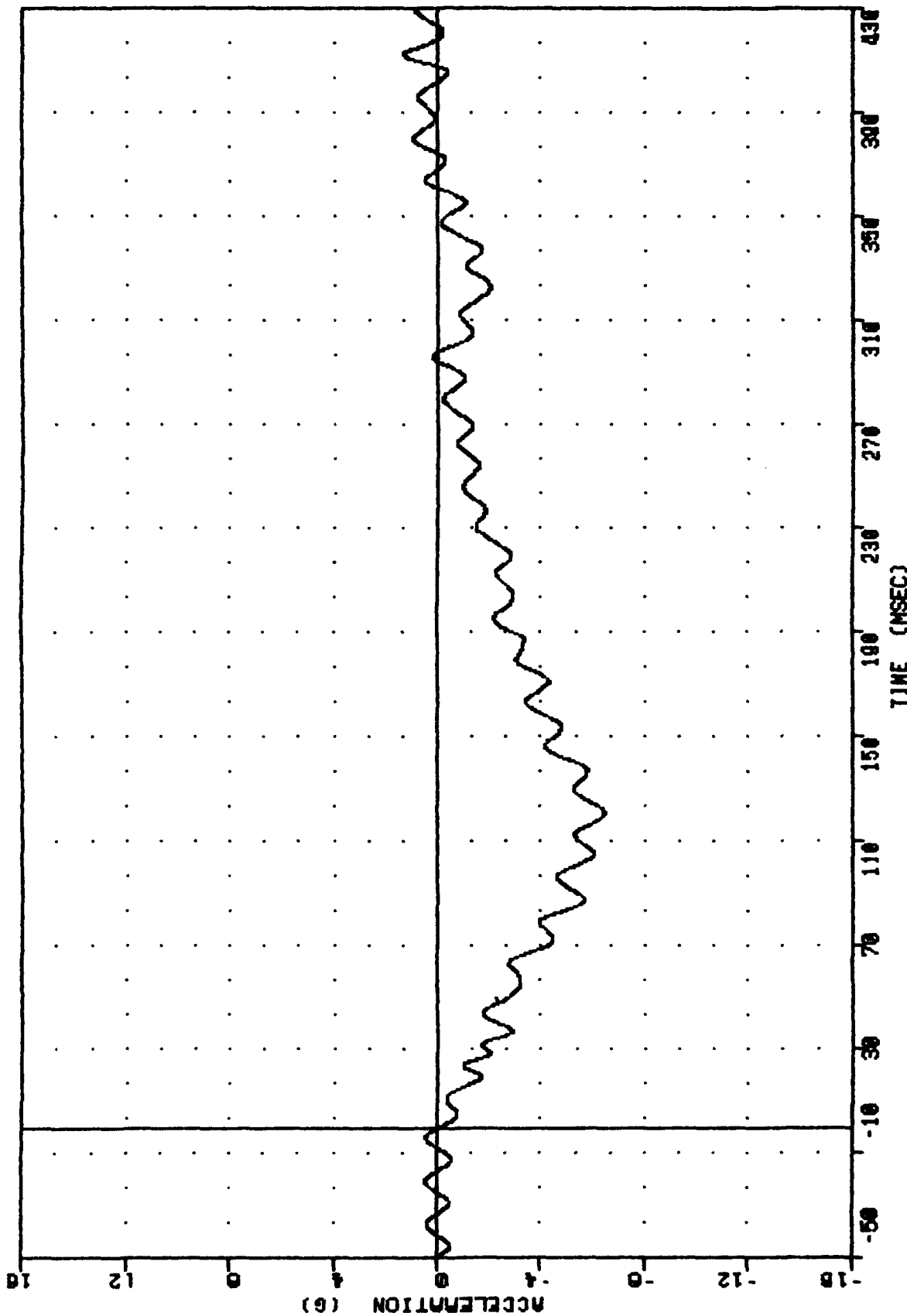
FAR
91023
FLFX6

. TEST 001

. OVERHEAD LUGGAGE BIN TEST

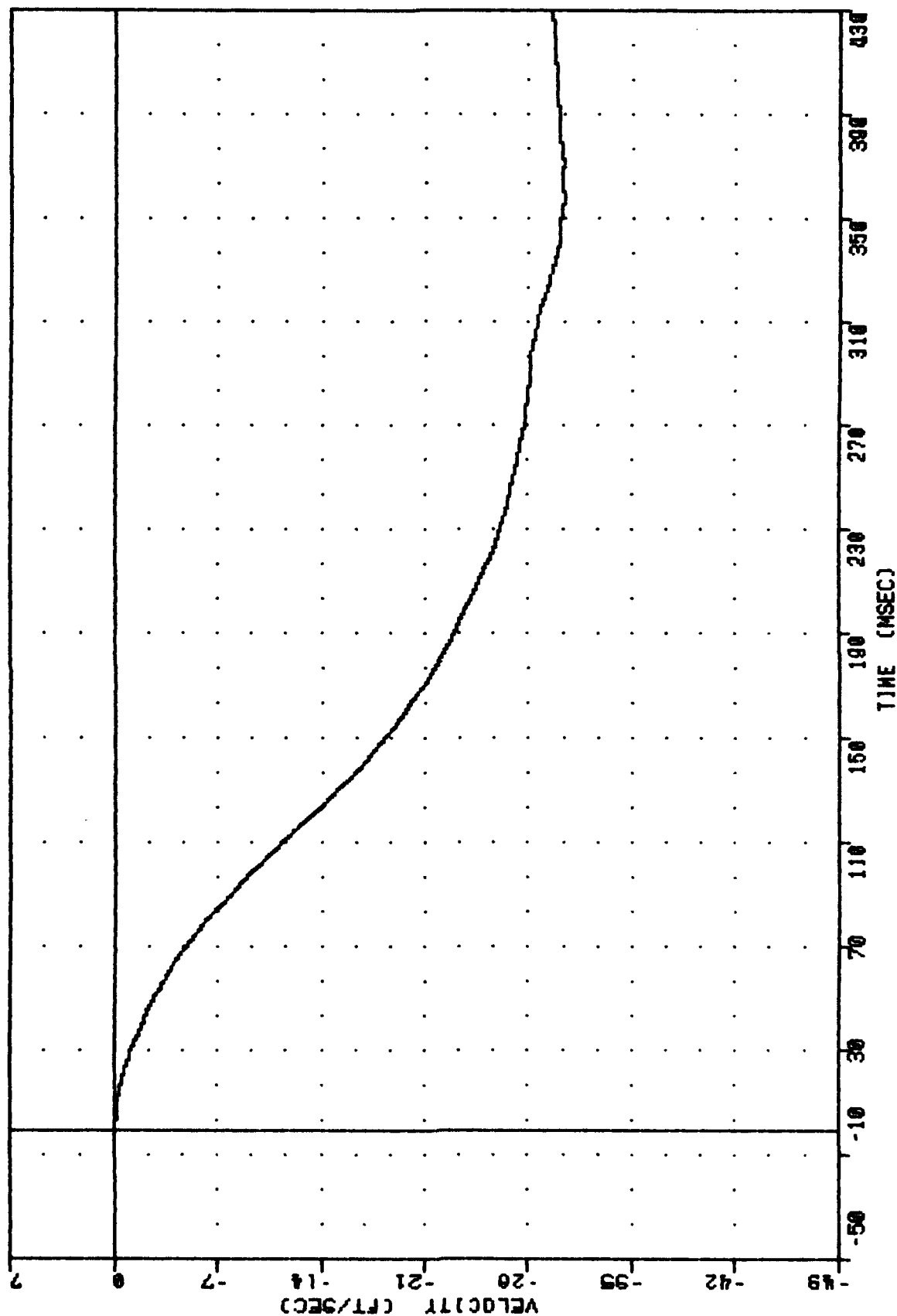
FILTER - BLPF 100/ 316/ -40

MIN. MAX VALUES = -8.47 121.00 1.28 412.25



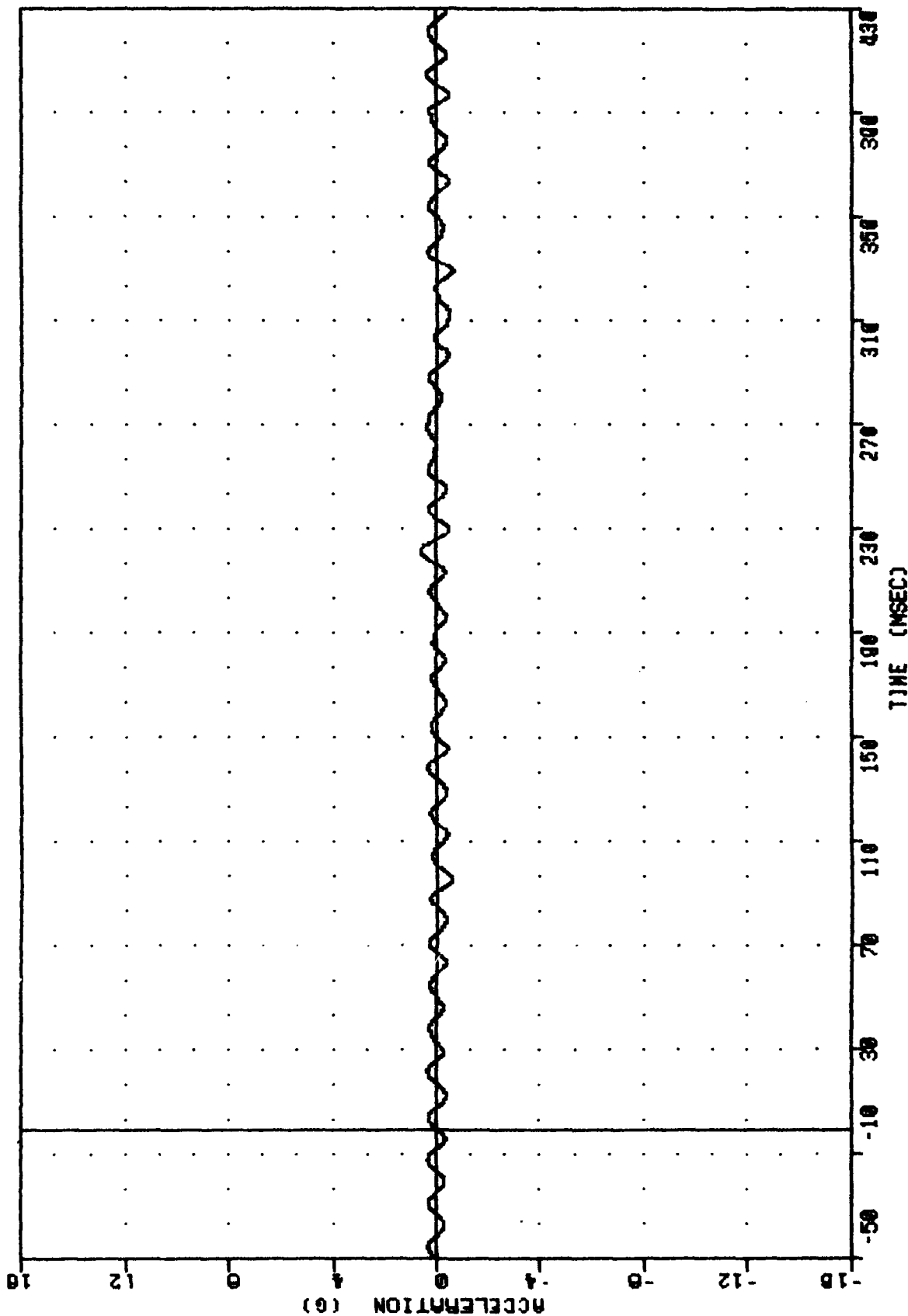
OVERHEAD LUGGAGE BIN 5. DG DYNAMIC TEST
FLOOR FORWARD LONGITUDINAL ACCELERATION

FAR . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 91023 FILTER - BLPF 300/ 949/ -40
 FLXY MIN, MAX VALUES : -30.33 336.50 . 0.03 37.13



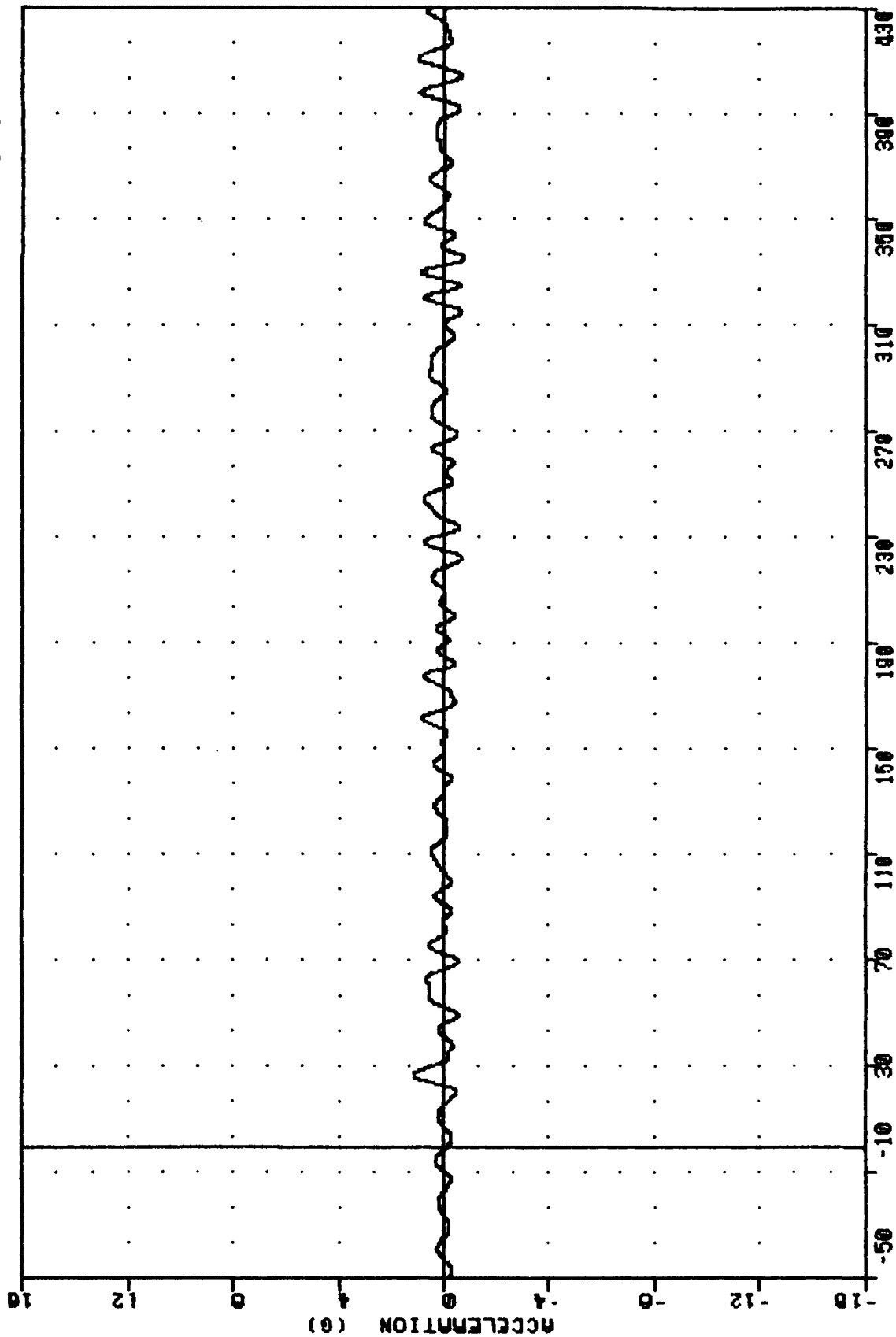
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 FLOOR FORWARD LONGITUDINAL VELOCITY

FAR . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 91023 FILTER = 8LPF 100/ 316/ -40
 FLFY6 MIN, MAX VALUES : -0.63g 329.50 , 0.57 g 221.89



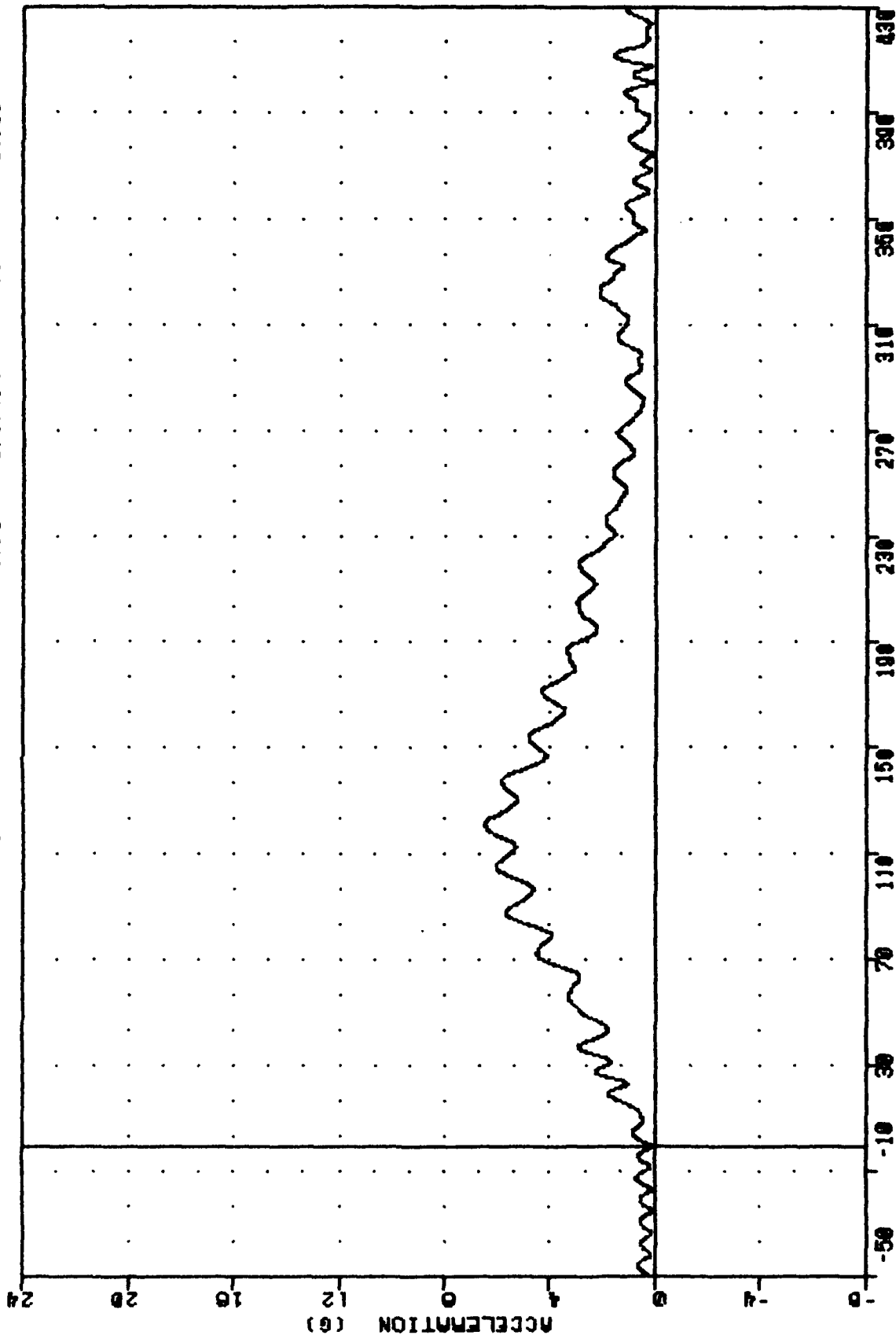
OVERHEAD LUGGAGE BIN 5. DG DYNAMIC TEST
 FLOOR FORWARD LATERAL ACCELERATION

FRA
 91023
 FLF26
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -0.778 335.25 , 1.17 20.85



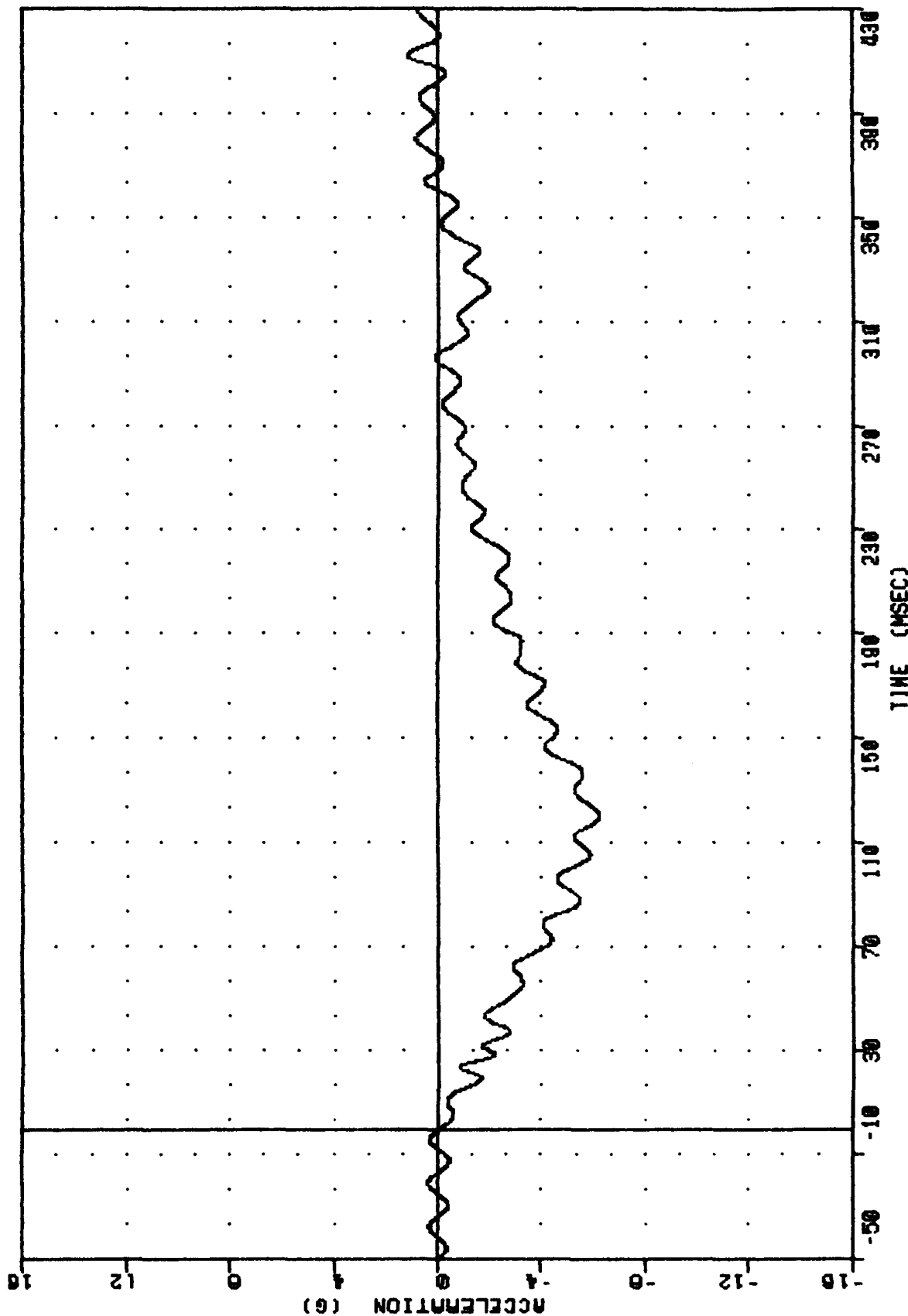
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 FLOOR FORWARD VERTICAL ACCELERATION

FAR
 91023
 FLFR6
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : 0.04g 374.25, 0.46 g 121.00



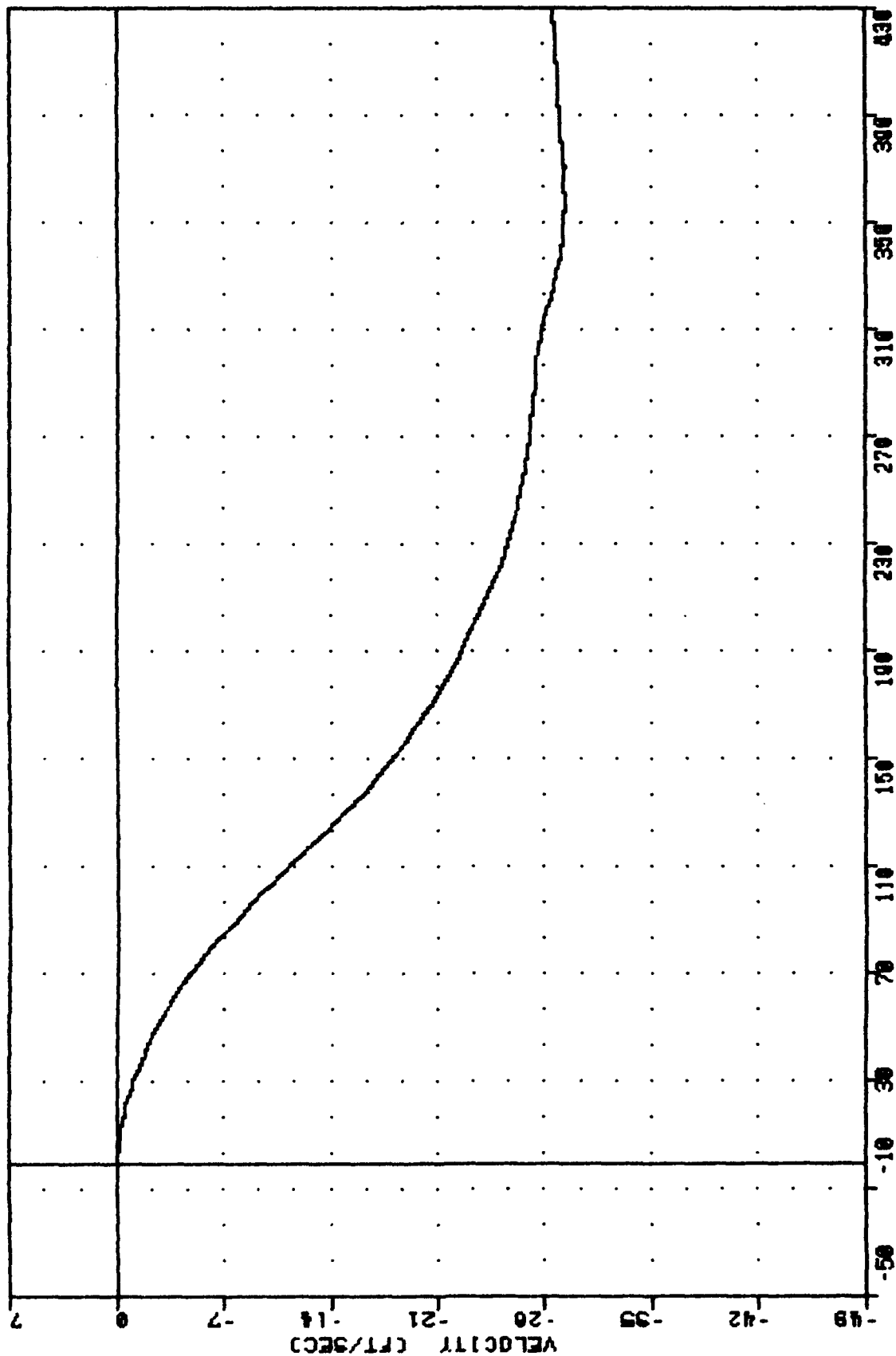
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 FLOOR FORWARD RESULTANT ACCELERATION

FAR
 91023
 FLAX6
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -0.20g 120.75, 1.14 g 412.56



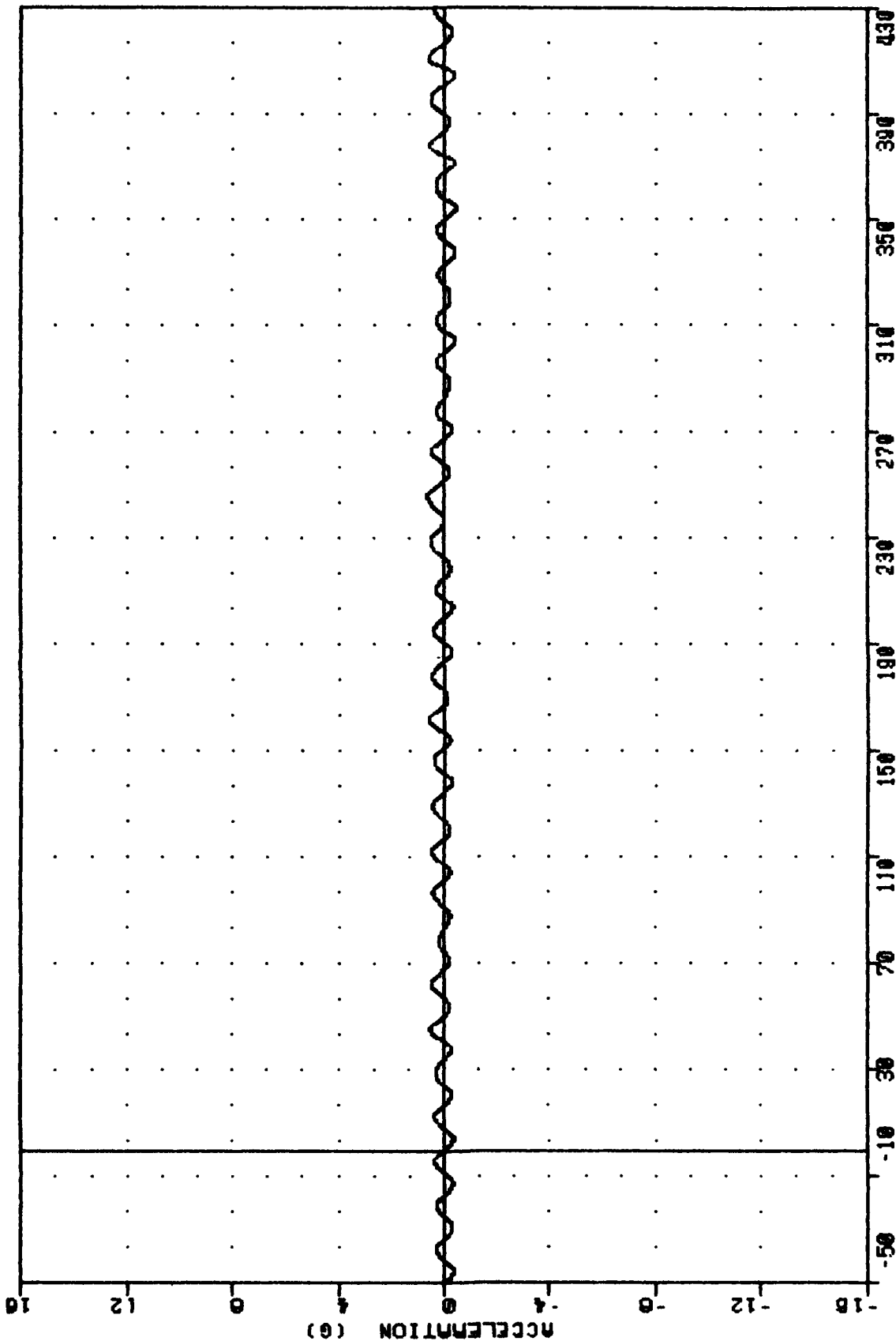
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 FLOOR AFT LONGITUDINAL ACCELERATION

FRA 91023
 FLAXV
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 300/ 949/ -40
 MIN. MAX VALUES : -29.37 338.13, 0.02 0 -37.15



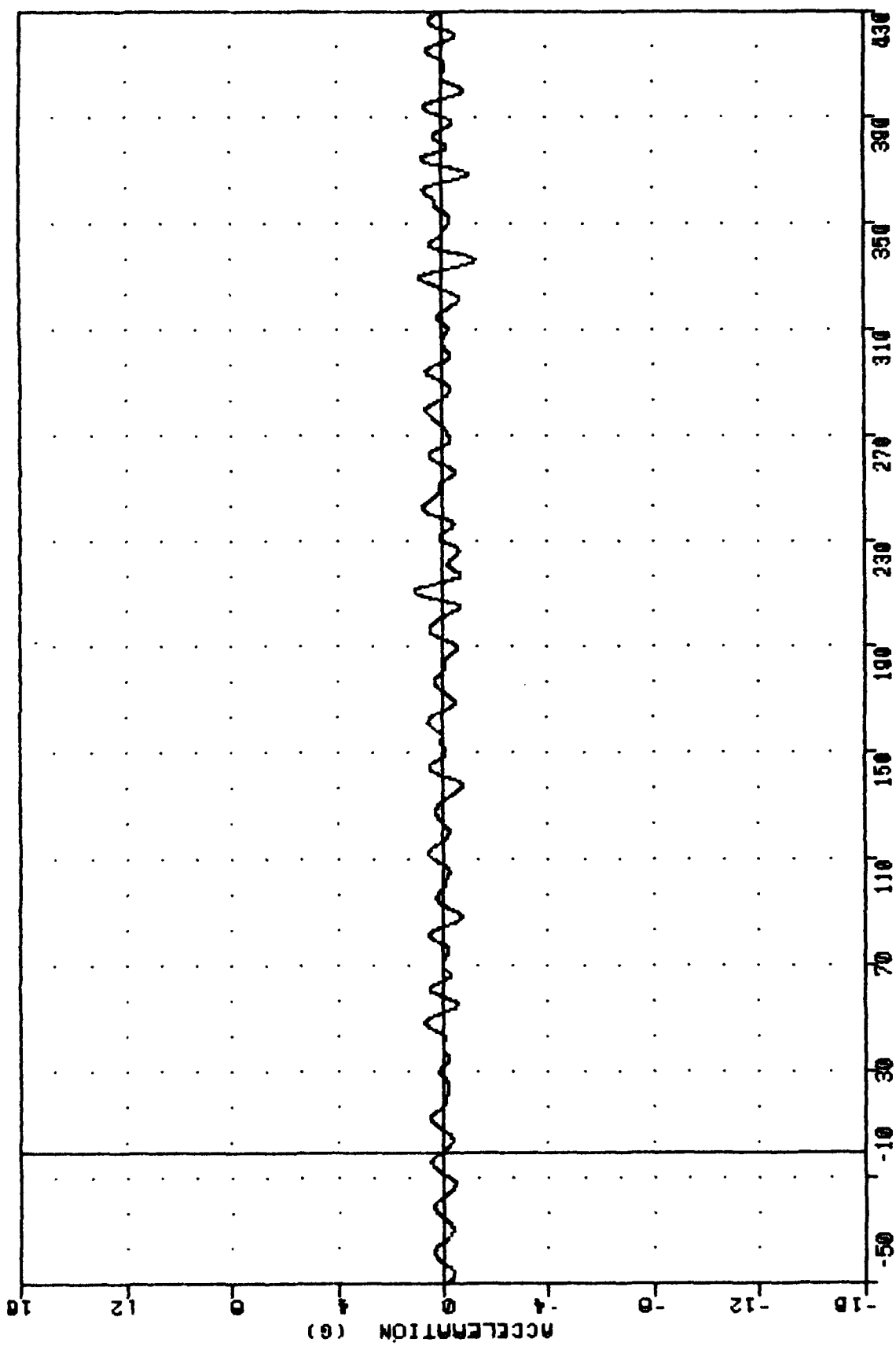
TIME (MSEC)
 OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 FLOOR AFT LONGITUDINAL VELOCITY

FRA . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 91023 FILTER - BLPF 100/ 316/ -40
 FLAY6 MIN. MAX VALUES = -0.450 334.25 . 0.03 210.00



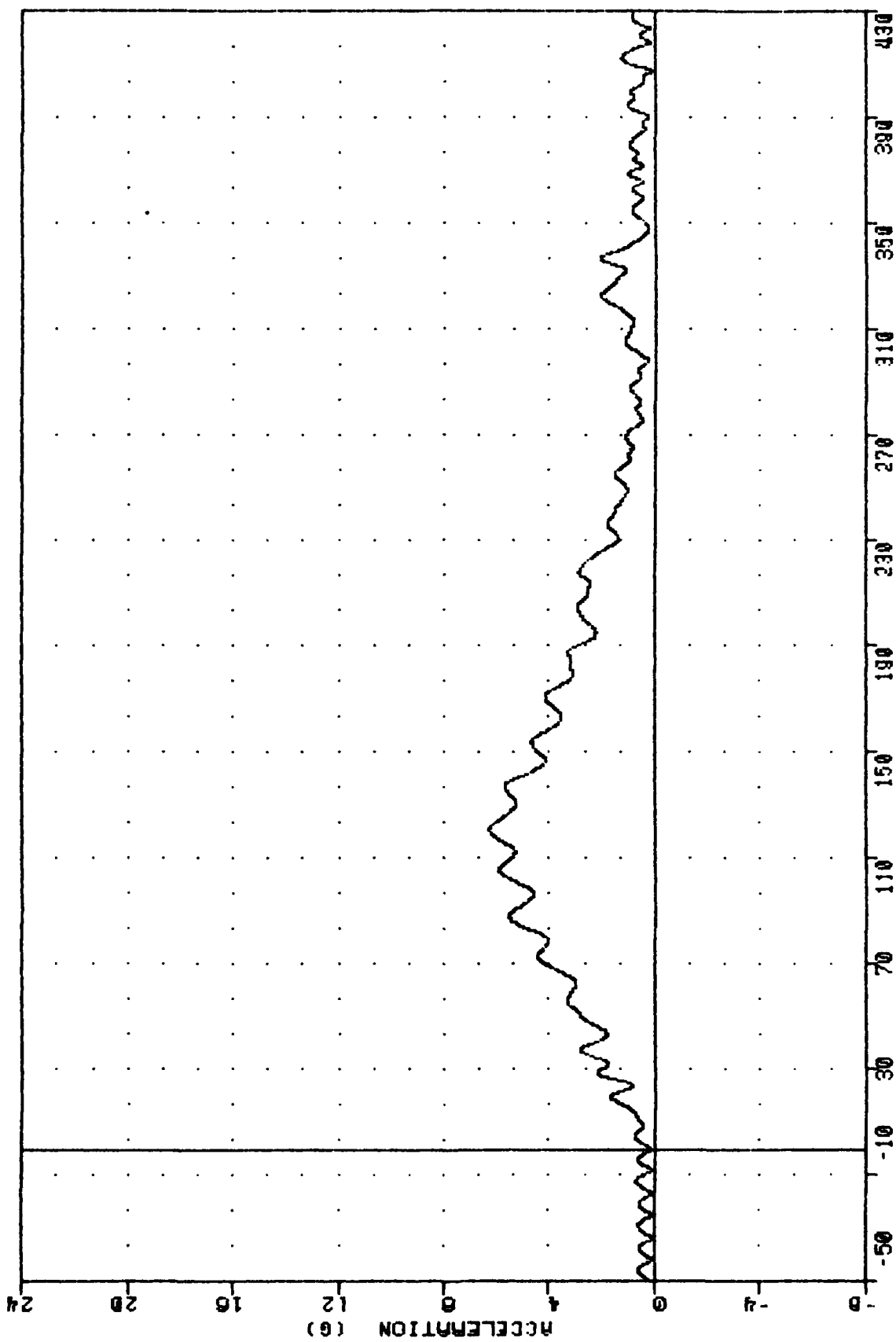
TIME (MSEC)
 OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 FLOOR AFT LATERAL ACCELERATION

FRA
 91023
 FLA26
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - 8LPF 100/ 316/ -40
 MIN. MAX VALUES : -1.27e 336.50 , 1.06 e 211.15



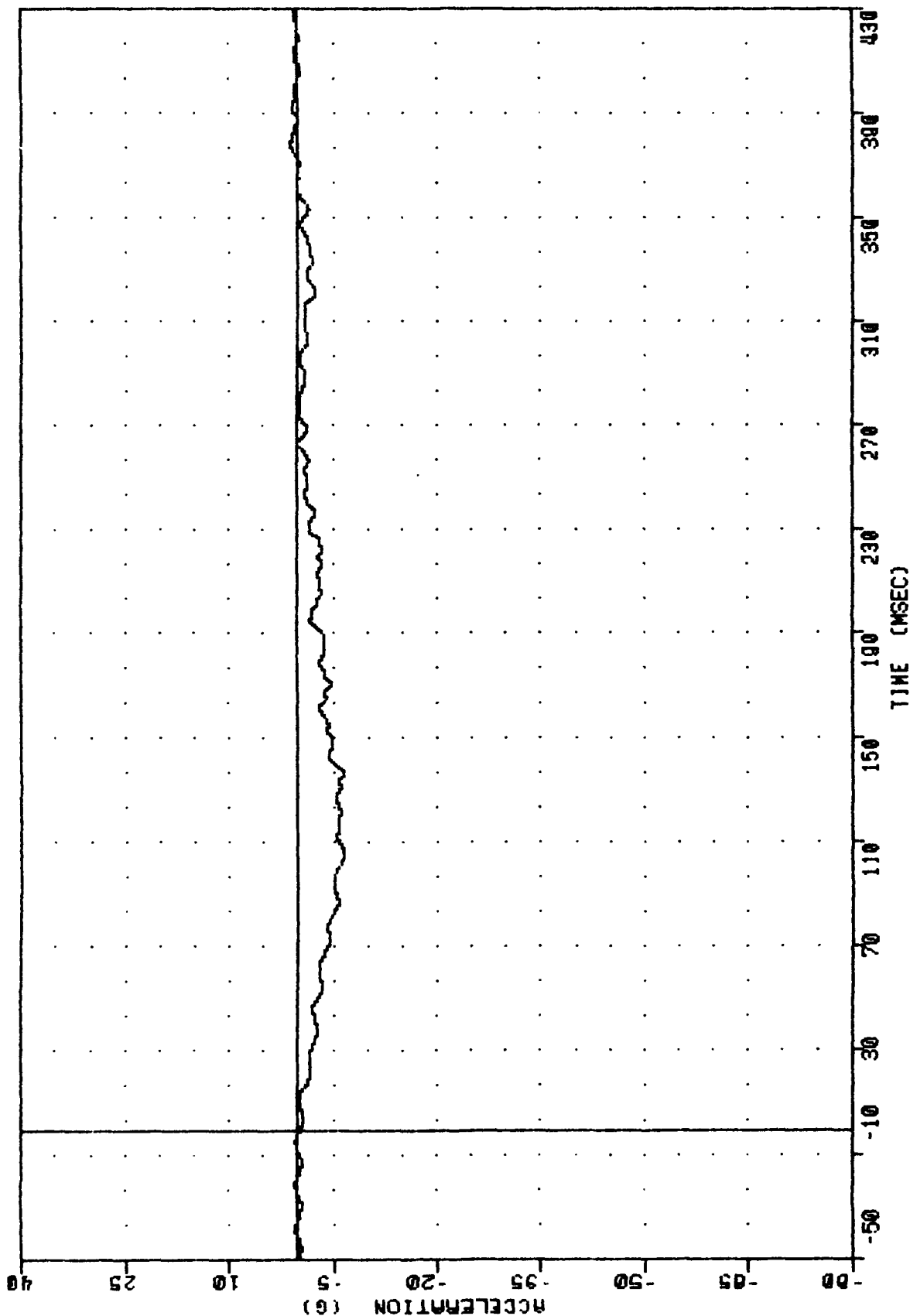
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 FLOOR AFT VERTICAL ACCELERATION

FAR 91023 FLAR6
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : 0.02g -17.00g 0.27g 120.75



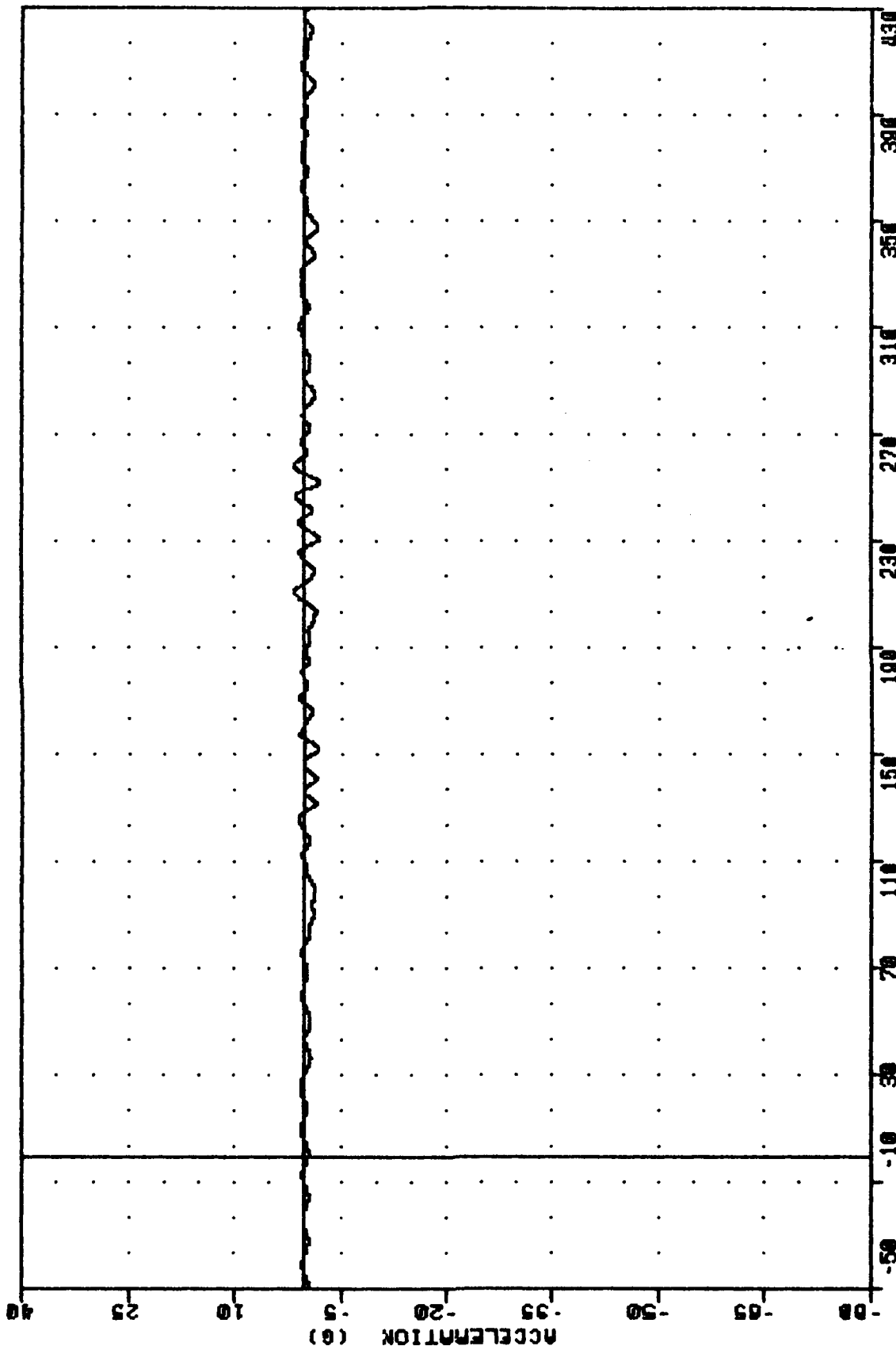
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 FLOOR AFT RESULTANT ACCELERATION

FRA . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 91023 FILTER - BLPF 100/ 316/ -40
 FNTX6 MIN. MAX VALUES : -6.64g 103.63 , 1.13 g 378.00



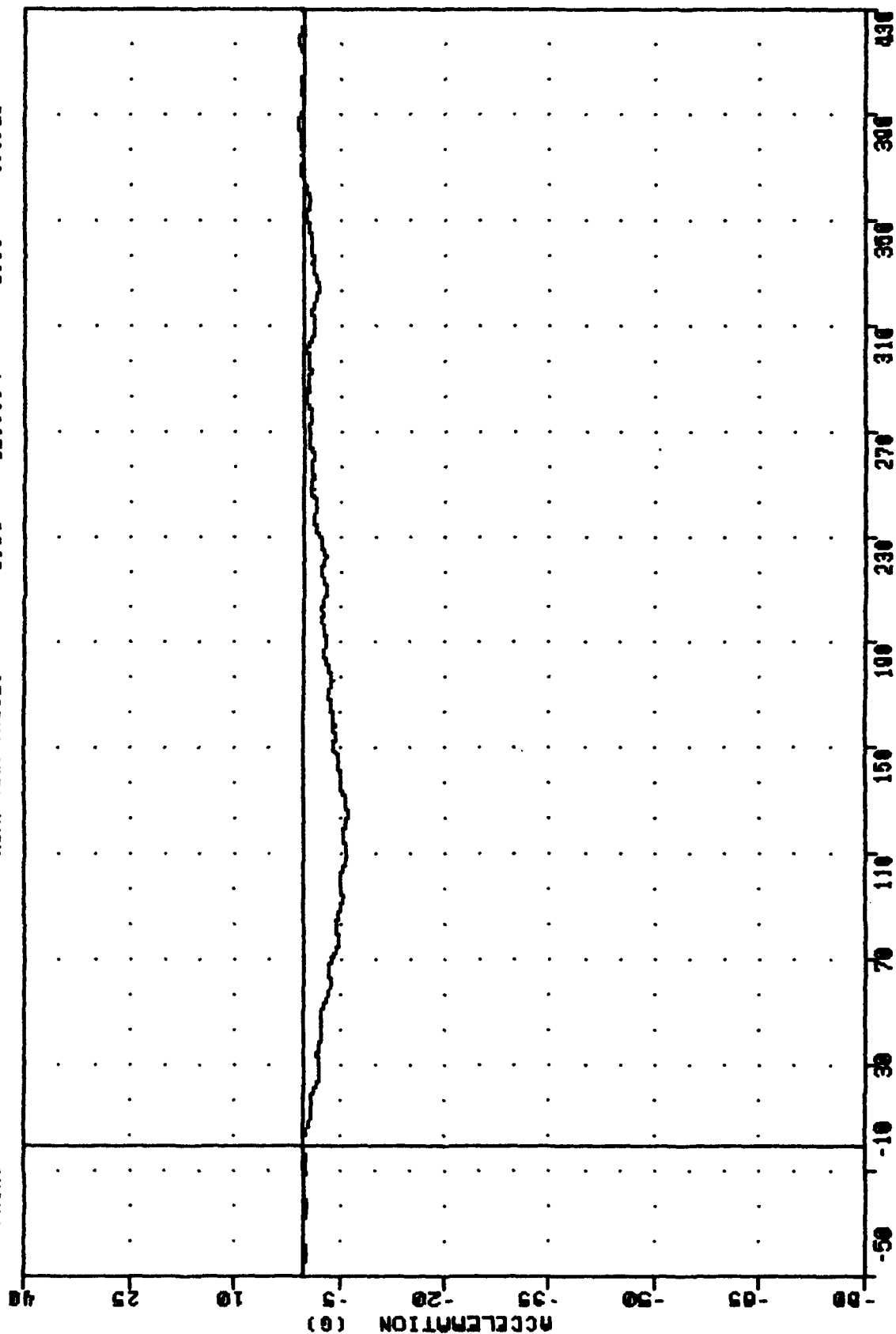
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 FUSELAGE MID TOP LONGITUDINAL ACCELERATION

FAR 91023
 FMT26
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - 8LPF 100/ 316/ -40
 MIN. MAX VALUES : -1.96g 252.13, 1.66g 238.65



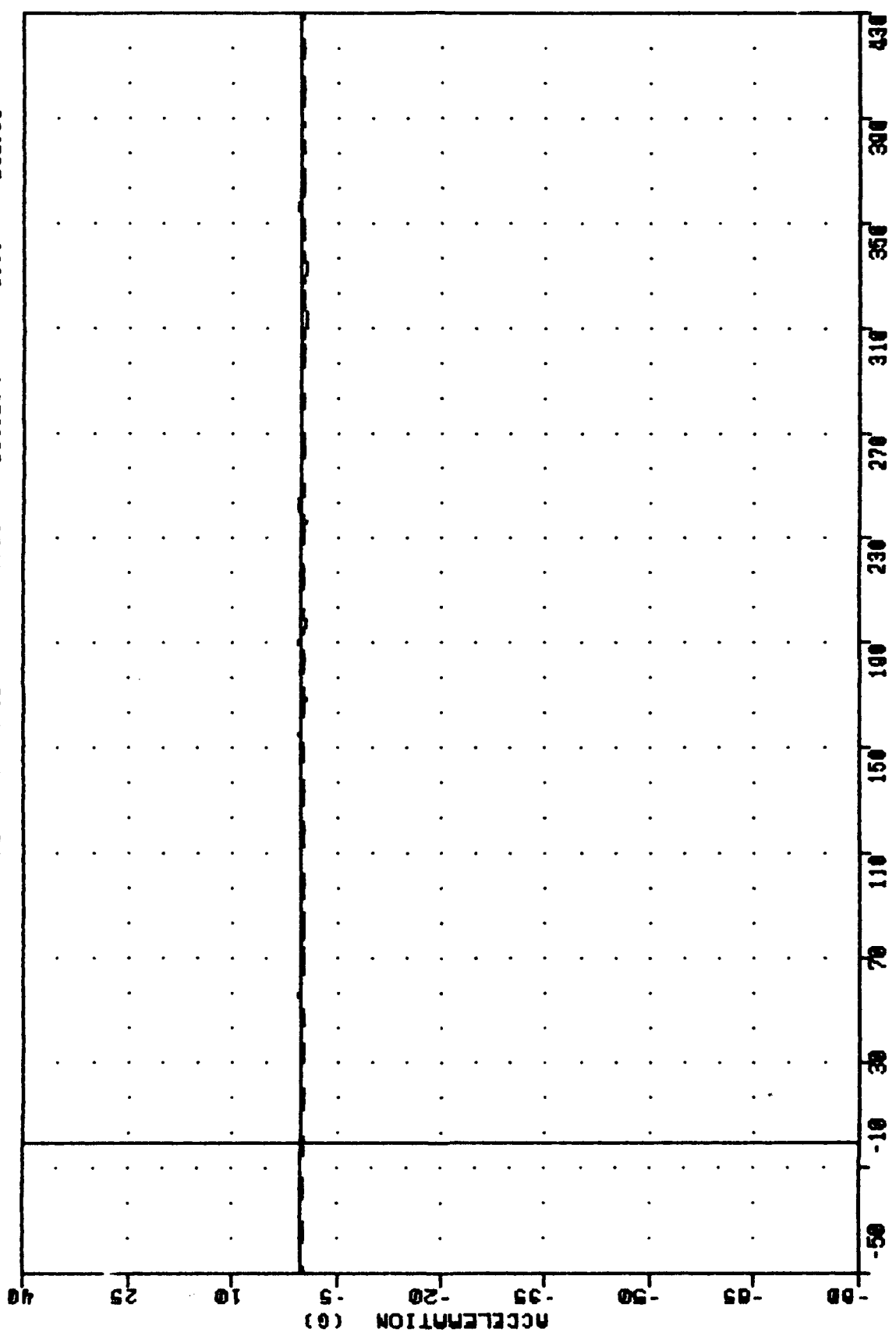
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 FUSELAGE MID TOP VERTICAL ACCELERATION

FRA 91023 FMSX6
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - 8LPE 100/ 316/ -40
 MIN. MAX VALUES : -6.14g 125.13g 0.00g 418.25g



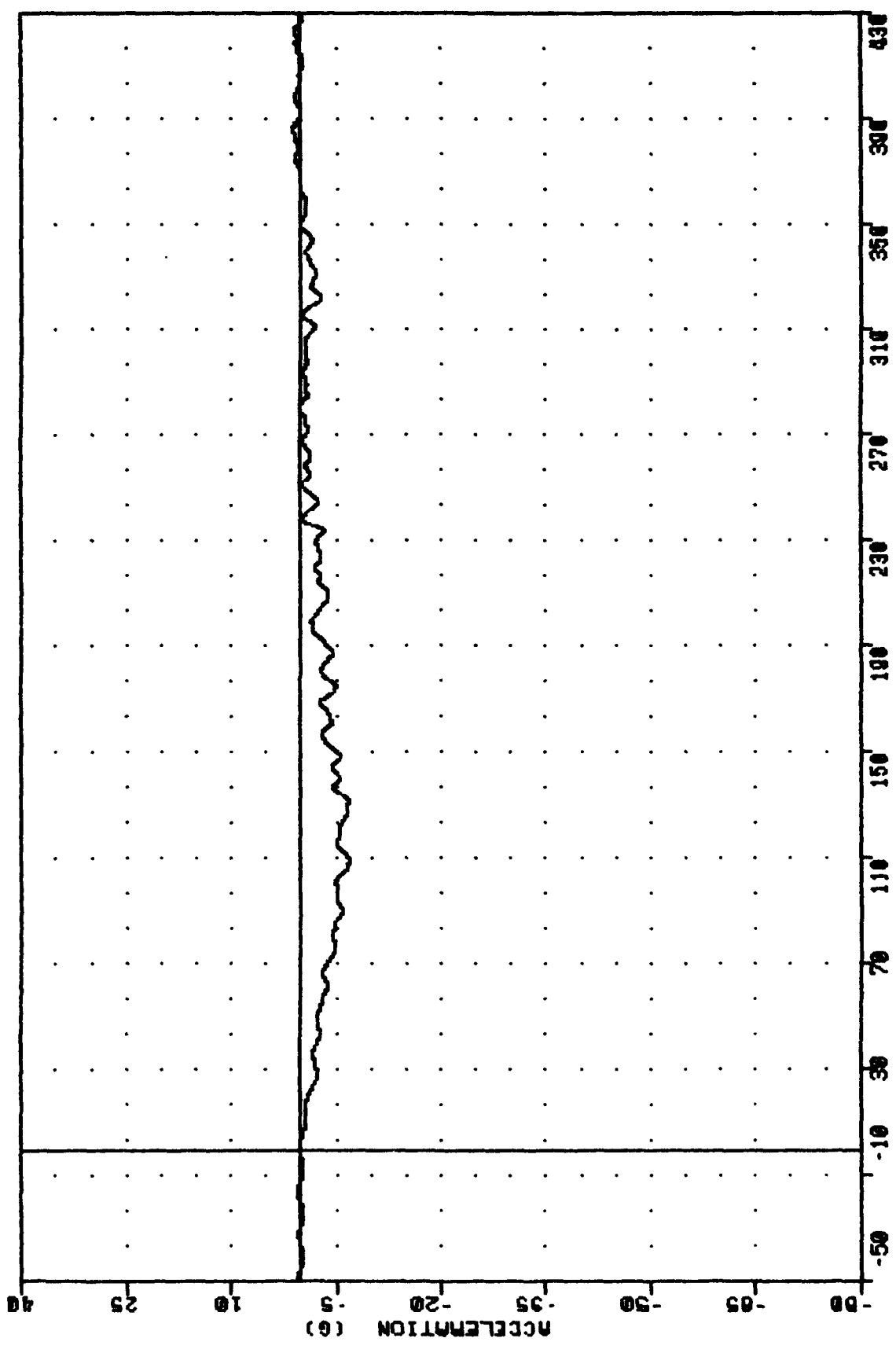
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 FUSELAGE MID STARBOARD LONGITUDINAL ACCELERATION

FRA
 91023
 FNS26
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -0.03g 314.25, 0.06 g 242.00



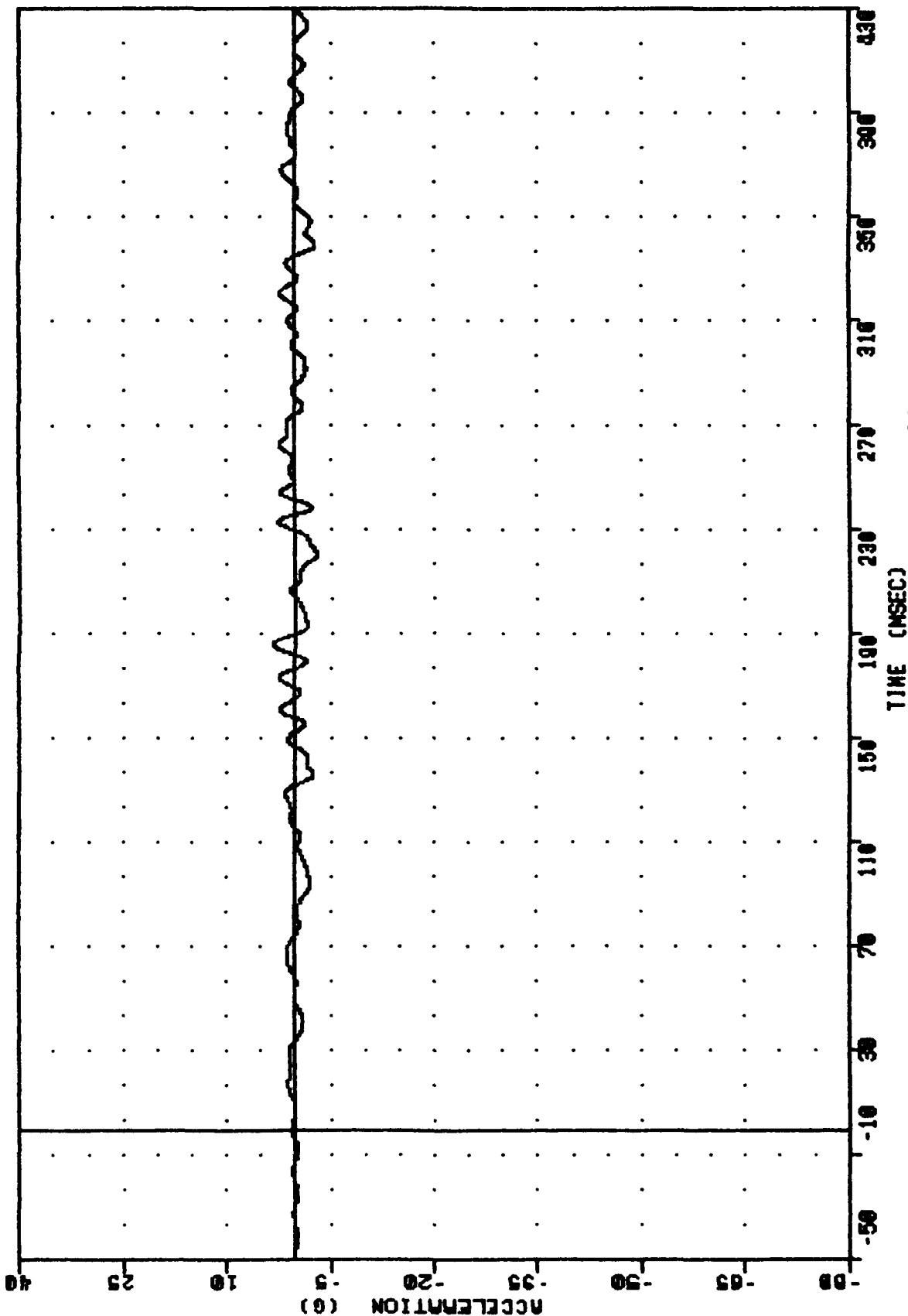
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 FUSELAGE MID STARBOARD VERTICAL ACCELERATION

FRA 91023 FATX6
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER = 0L PF 100/ 316/ -40
 MIN. MAX VALUES : -6.67 131.03 1.12 365.00



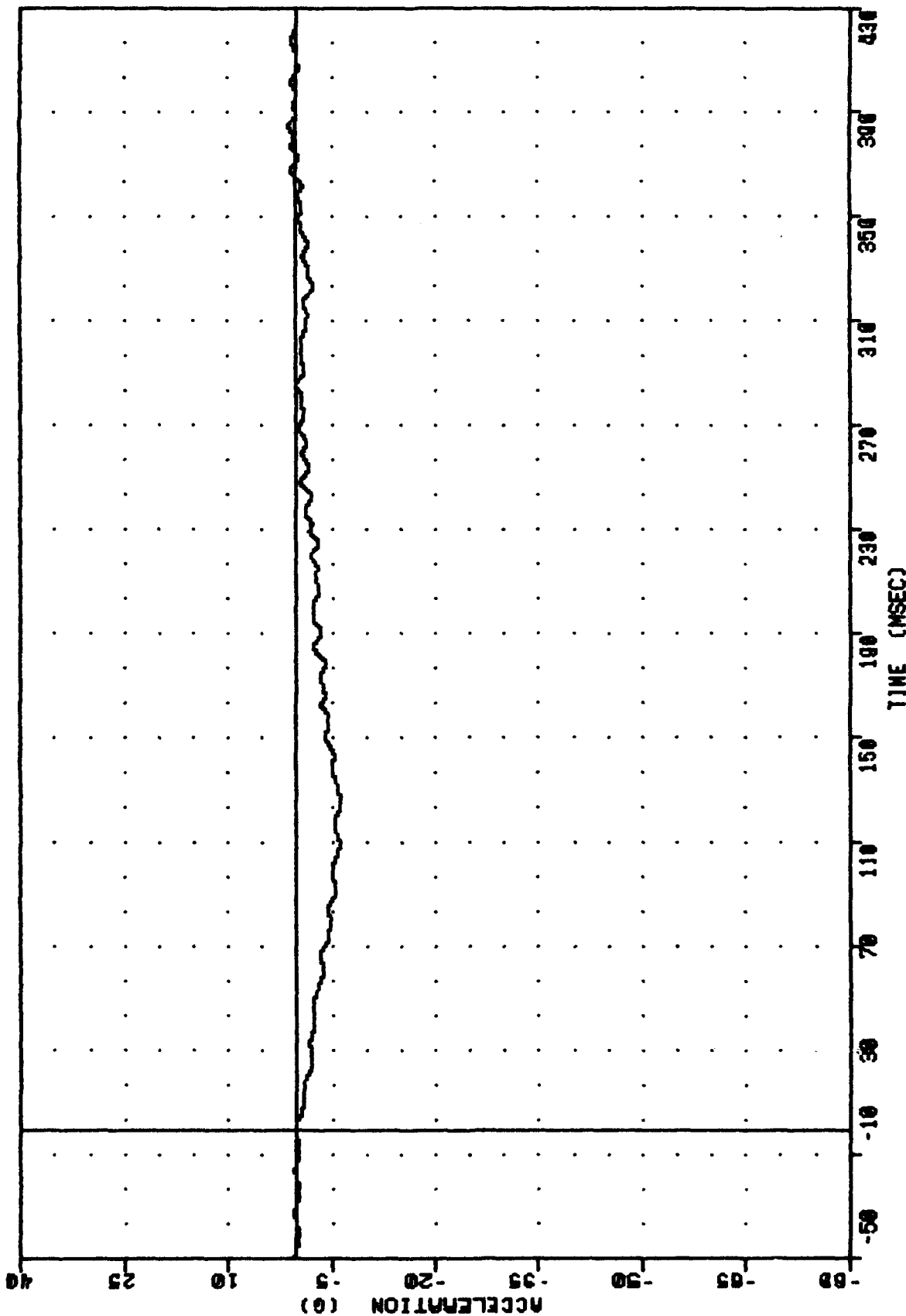
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 FUSELAGE AFT TOP LONGITUDINAL ACCELERATION

FRA . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 81023 FILTER - BLPF 100/ 310/ -40
 PAT26 MIN. MAX VALUES : -5.040 220.50 . 3.30 0 100.23



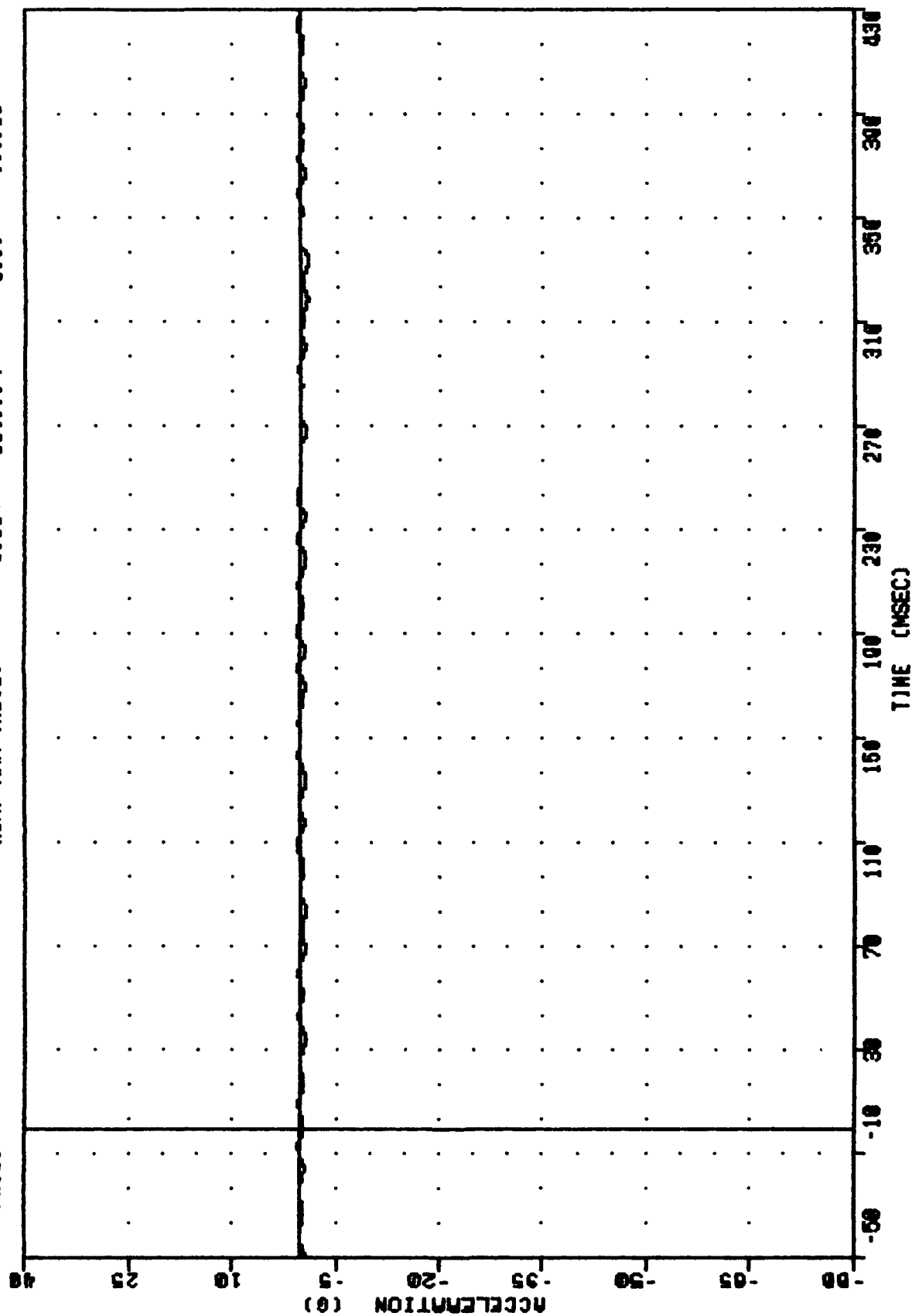
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 FUSELAGE AFT TOP VERTICAL ACCELERATION

FRA
 91023
 F03X6
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -6.550 124.50 . 1.07 e 384.85



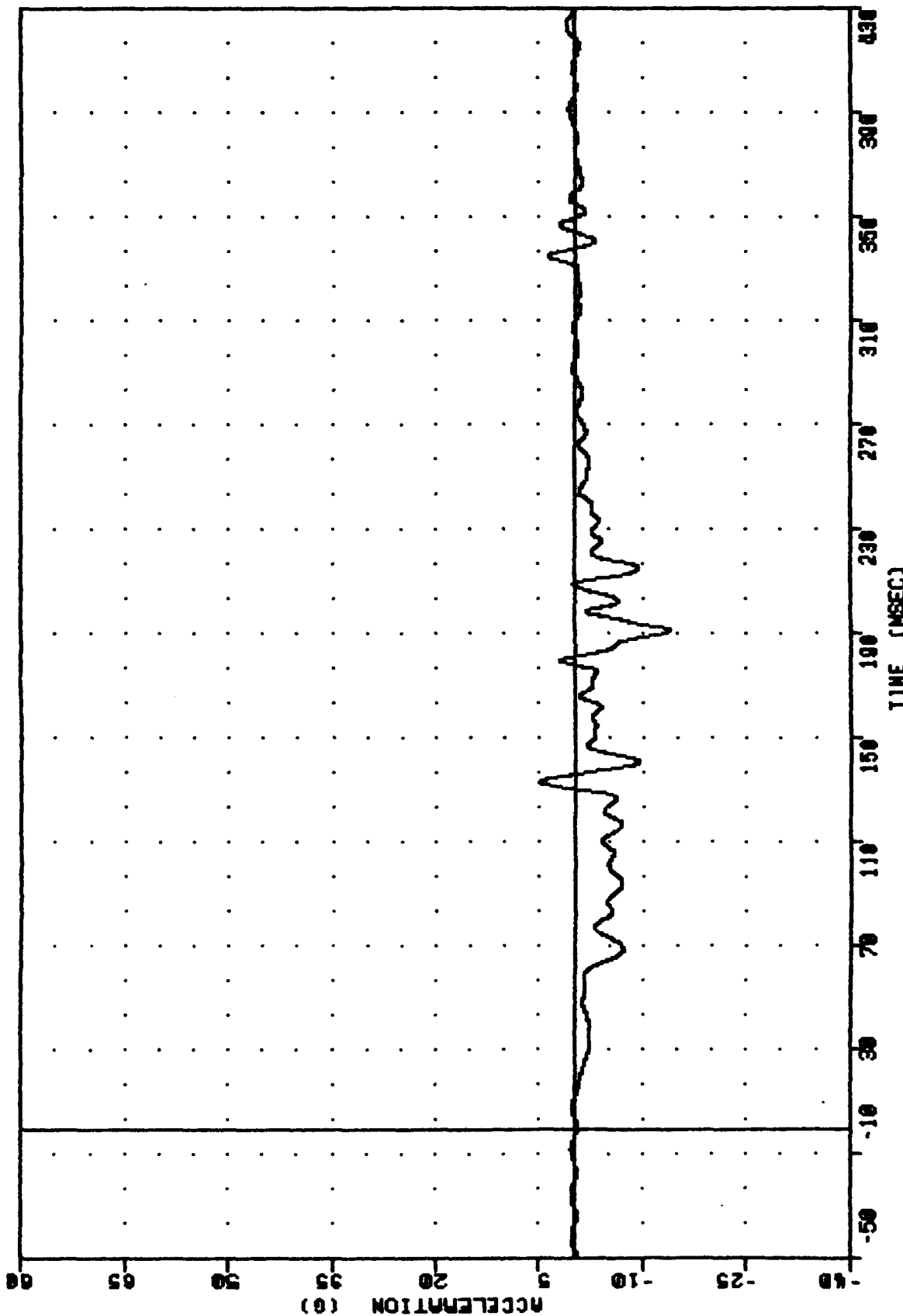
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 FUSELAGE AFT STARBOARD LONGITUDINAL ACCELERATION

FRR
 91023
 FASZ6
 . TEST 001
 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -0.68e 334.13, 0.59 e 109.50



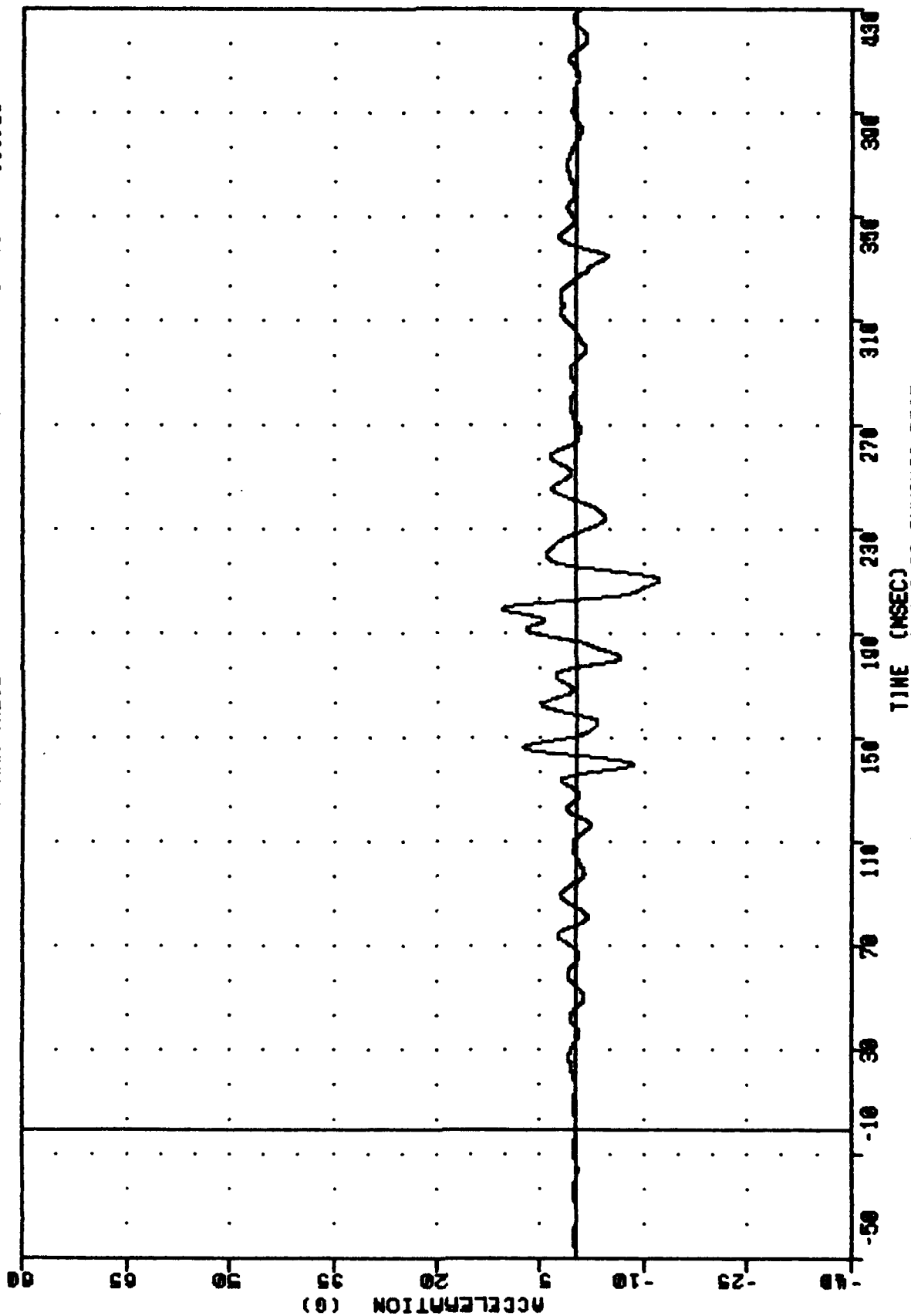
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 FUSELAGE AFT STARBOARD VERTICAL ACCELERATION

FAR 91023 80X6
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -14.028 191.25 , 3.01 133.13



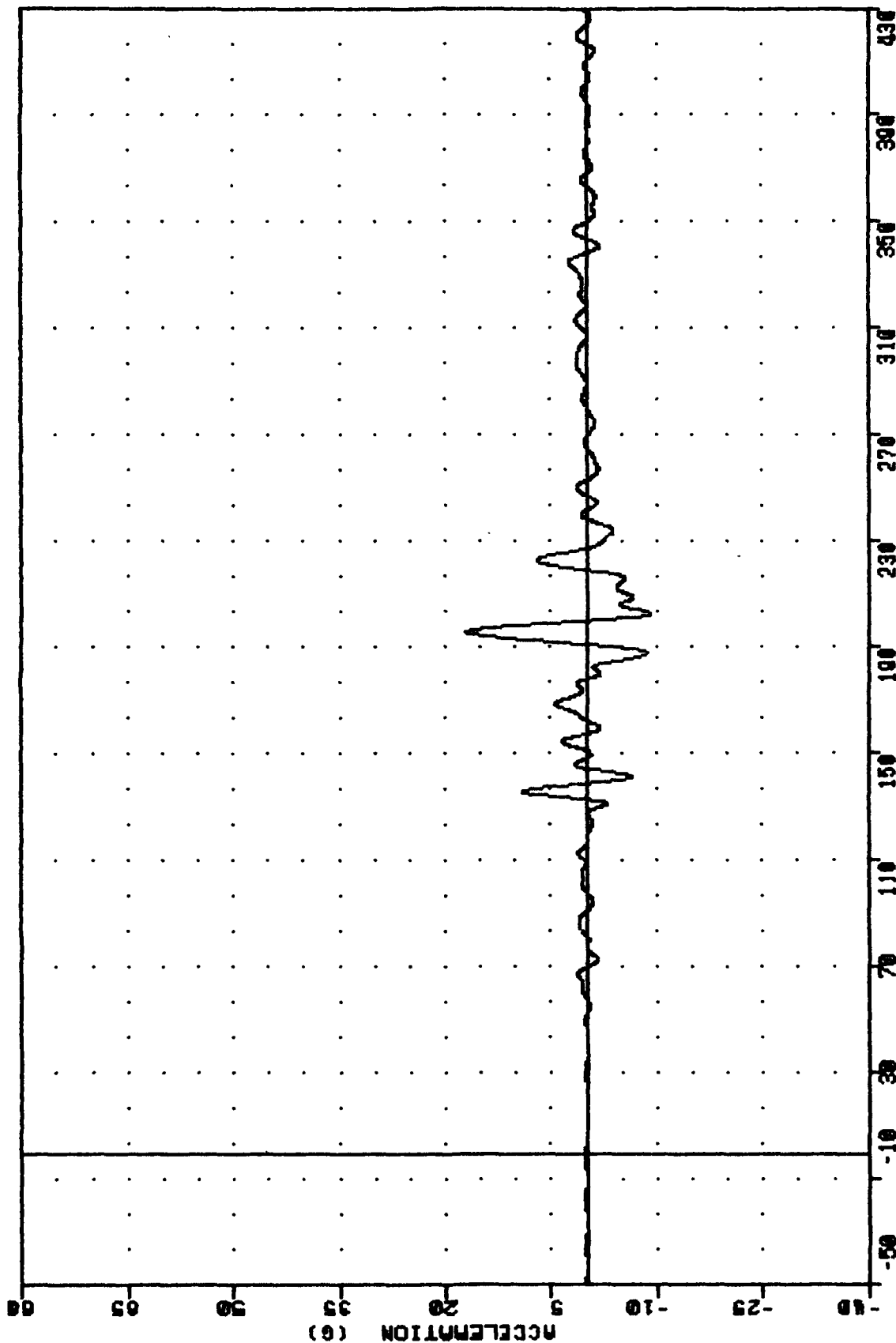
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 BIN B LONGITUDINAL ACCELERATION

FRA 91023 88Y6 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -12.19 210.03, 10.43 199.83



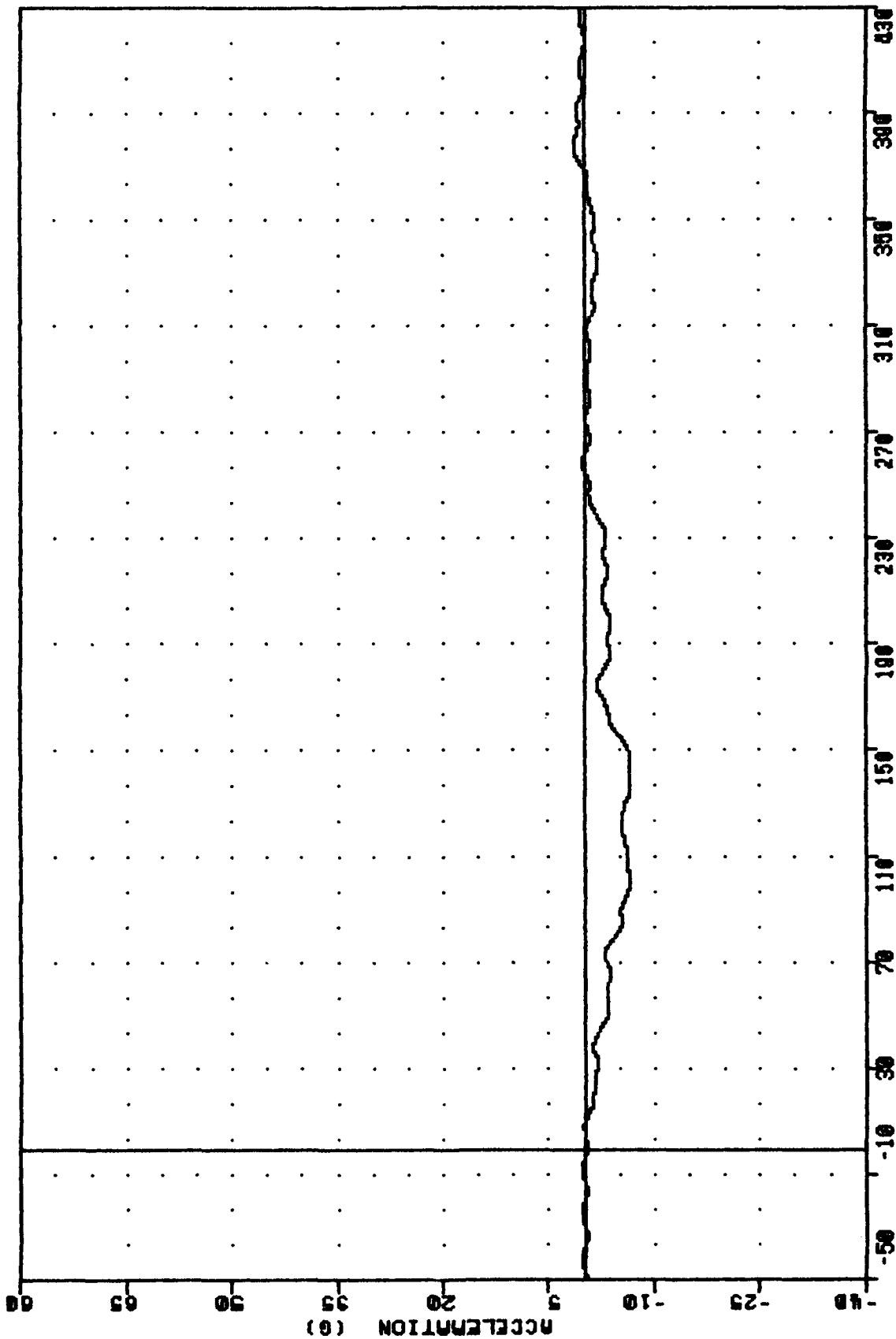
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 BIN B LATERAL ACCELERATION

FRA 91023
 0026
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -9.000 202.03, 17.00 195.75



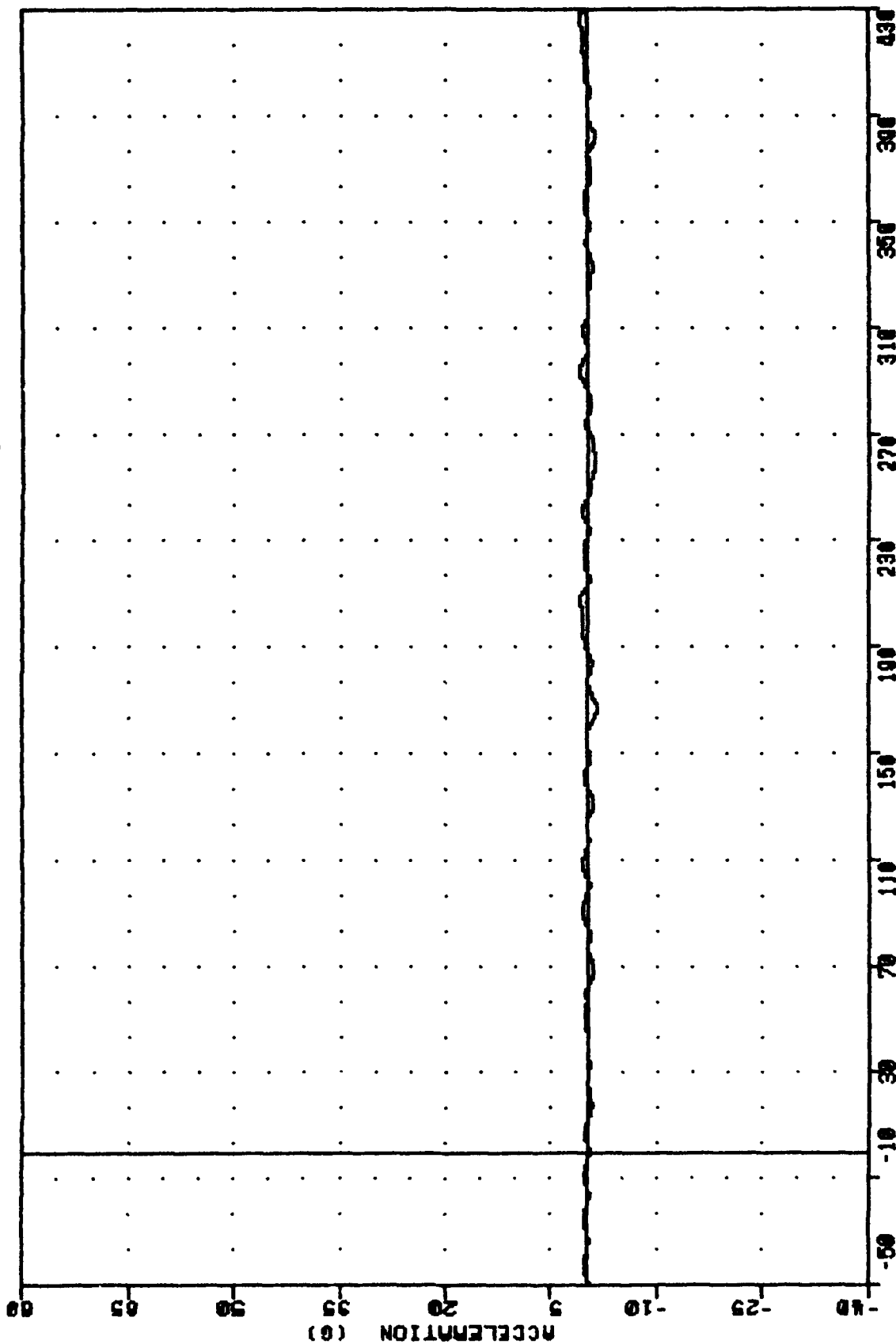
TIME (MSEC)
 OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 BIN B VERTICAL ACCELERATION

FRA 91023 H0X6
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -0.00e 135.25 . 1.35 e 377.25



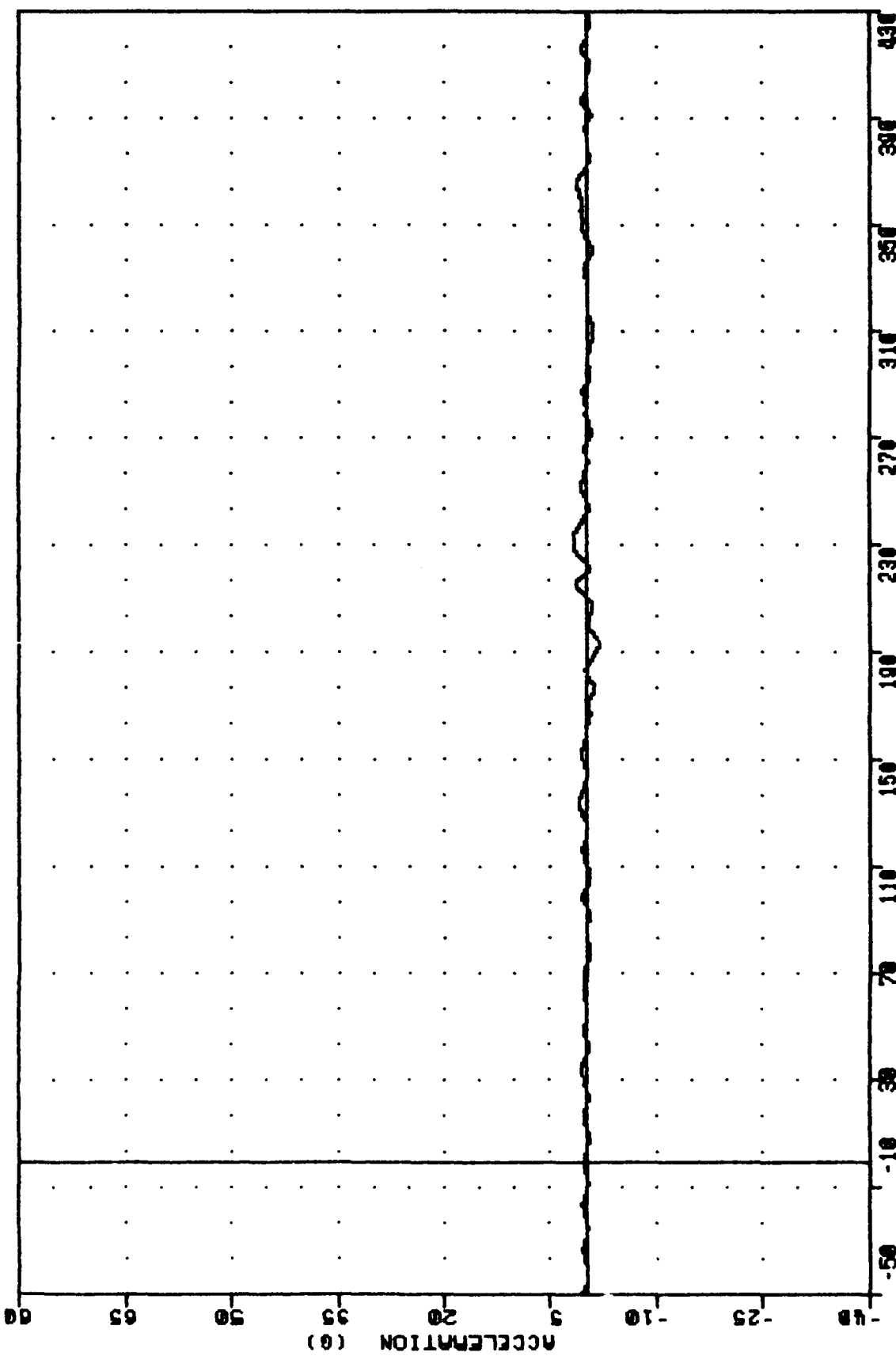
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 BIN A LONGITUDINAL ACCELERATION

FRA
 91023
 HDY6
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -1.05 107.13, 0.97 293.58



OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 BIN A LATERAL ACCELERATION

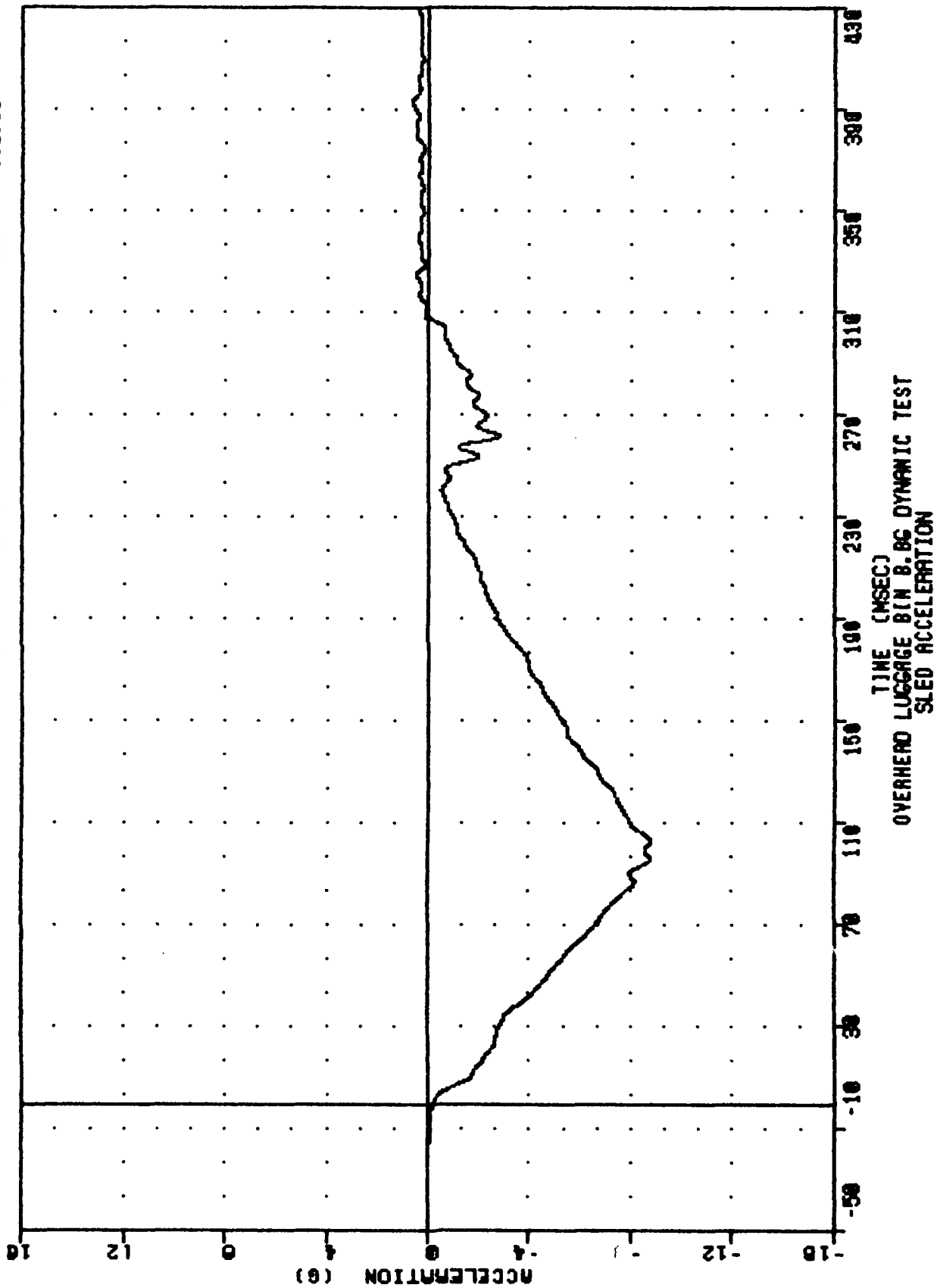
FRA 91023
 HBZ6
 . TEST 001 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -1.09% 193.23, 1.79 & 230.03



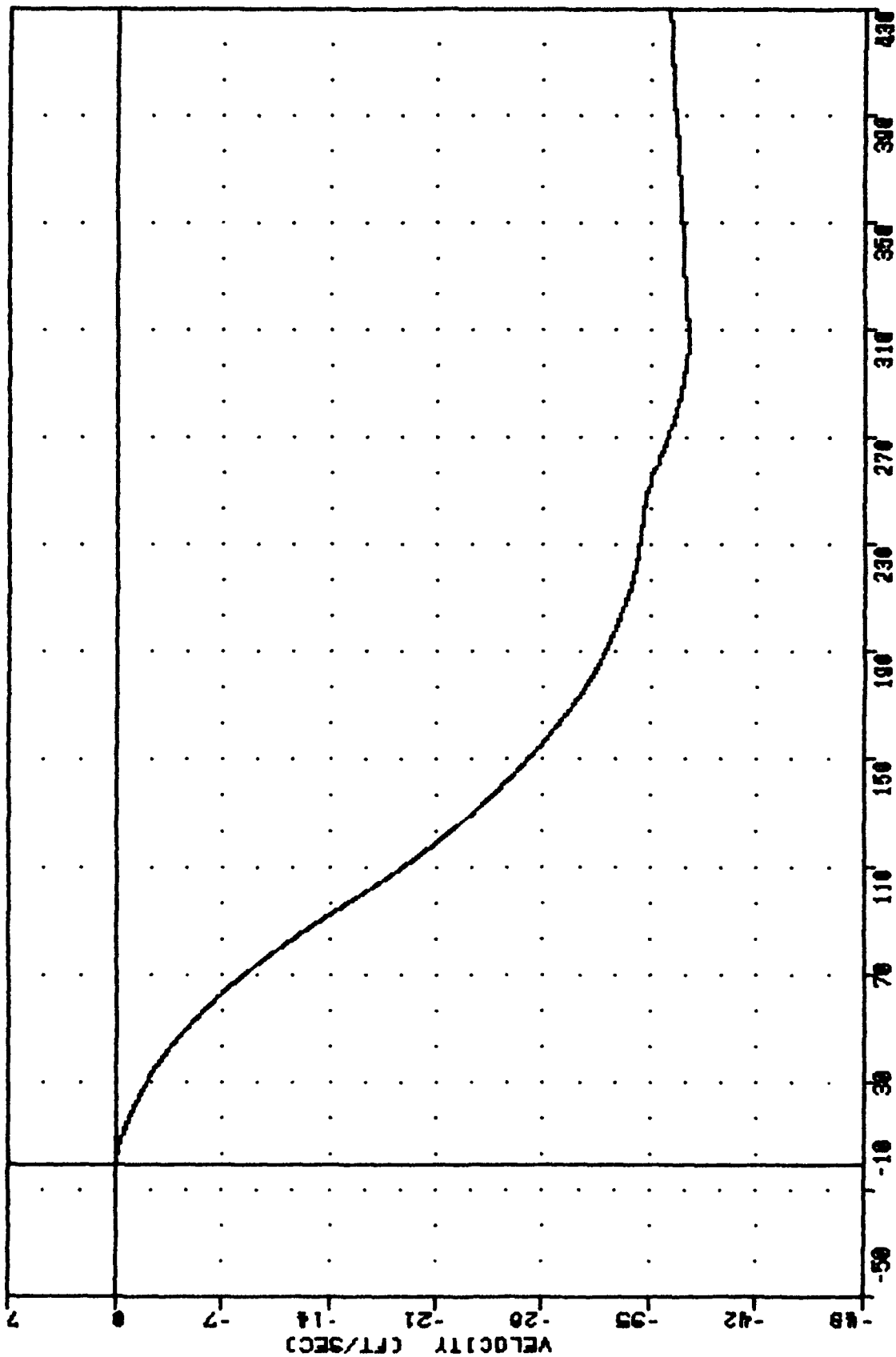
OVERHEAD LUGGAGE BIN 5.0G DYNAMIC TEST
 BIN A VERTICAL ACCELERATION

TEST 002

FAR
 91024
 SLDX6
 . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100 / 316 / -40
 MIN, MAX VALUES : -8.76 103.13 , 0.63 392.83



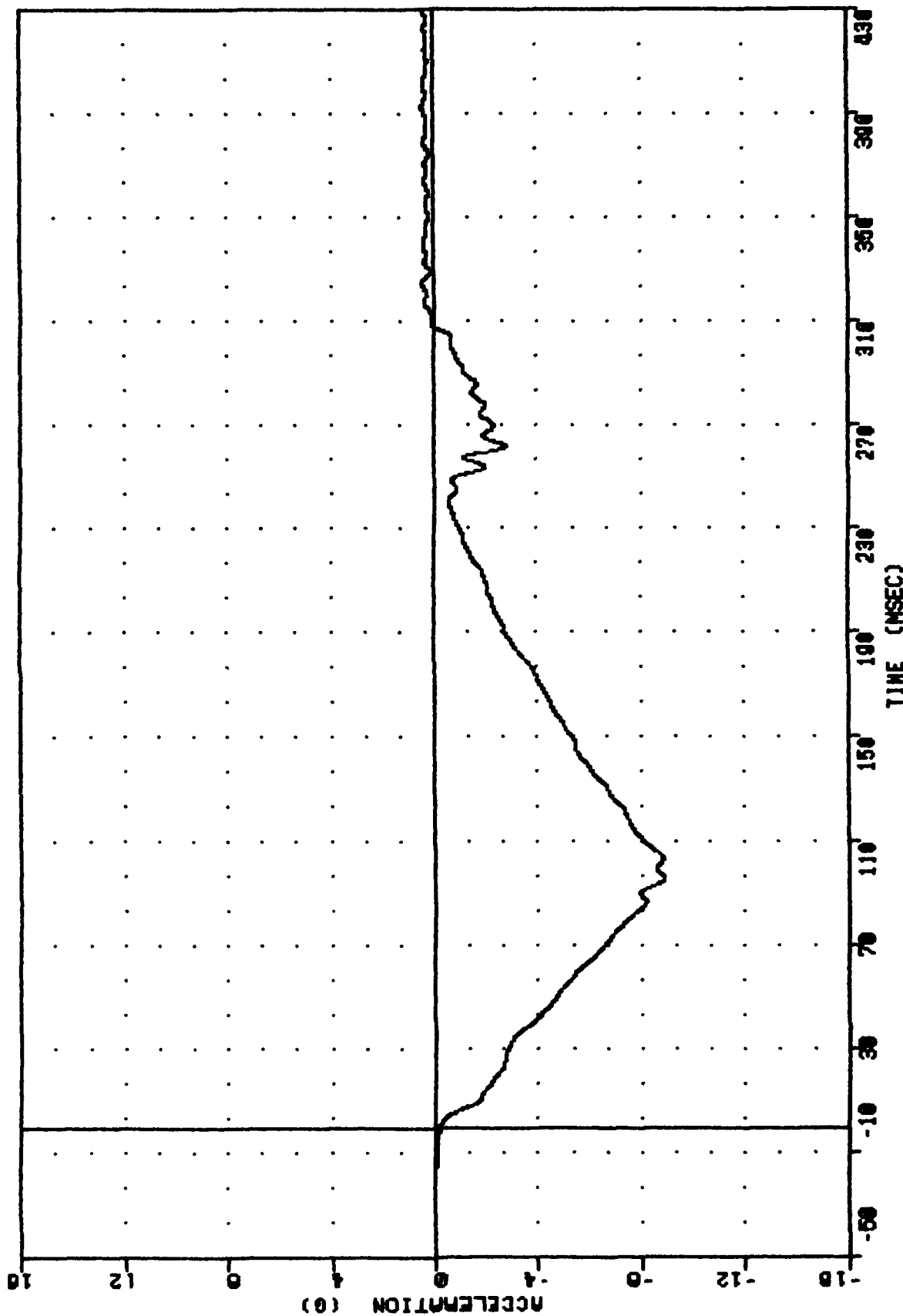
FRA . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 91024 FILTER - BLPF 300/ 949/ -40
 3LDXYI MIN, MAX VALUES : -37.40 303.63, 0.00 40.13



OVERHEAD LUGGAGE BIN B.C. DYNAMIC TEST
 SLED VELOCITY INTEGRATED

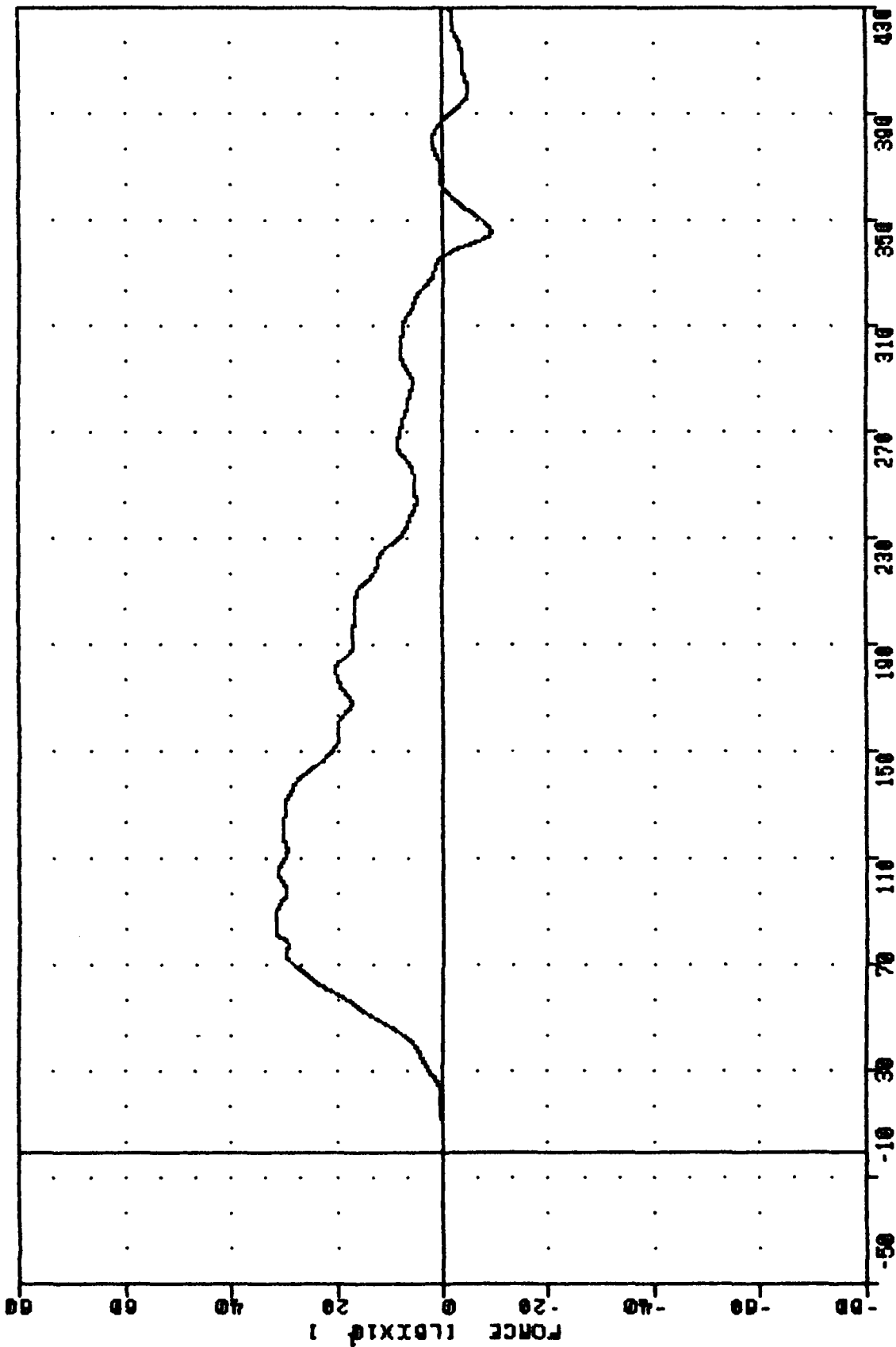
FRA
 91024
 9L0X6A

. TEST 002 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -8.87e 95.86 , 0.47 e 324.85



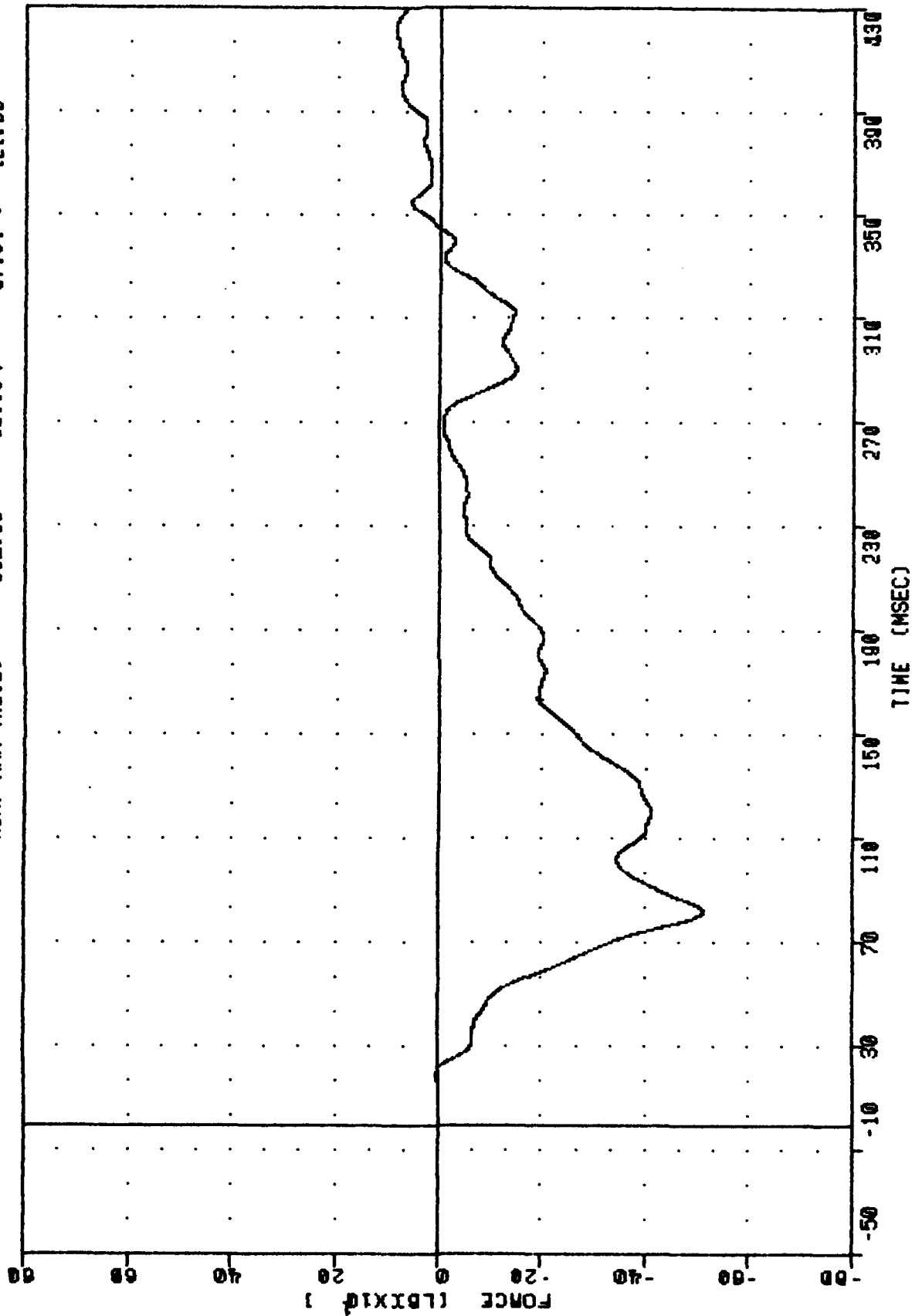
TIME (MSEC)
 OVERHEAD LUGGAGE BIN B. BC DYNAMIC TEST
 SLED ACCELERATION REDUNDANT

FRA 91024 7703 . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -92.88 345.88 , 317.96 83.58



TIME (MSEC)
 OVERHEAD LUGGAGE BIN B.BG DYNAMIC TEST
 BIN B TURNBUCKLE 78 FORCE

FRA 91024 T003
 . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 FILTER - 8LPF 100/ 316/ -40
 MIN, MAX VALUES : -512.59 87.04 421.50



OVERHEAD LUGGAGE BIN B.BG DYNAMIC TEST
 BIN B TURNBUCKLE 8B FORCE

FRA
91024
T1783

TEST 002

OVERHEAD LUGGAGE BIN TEST

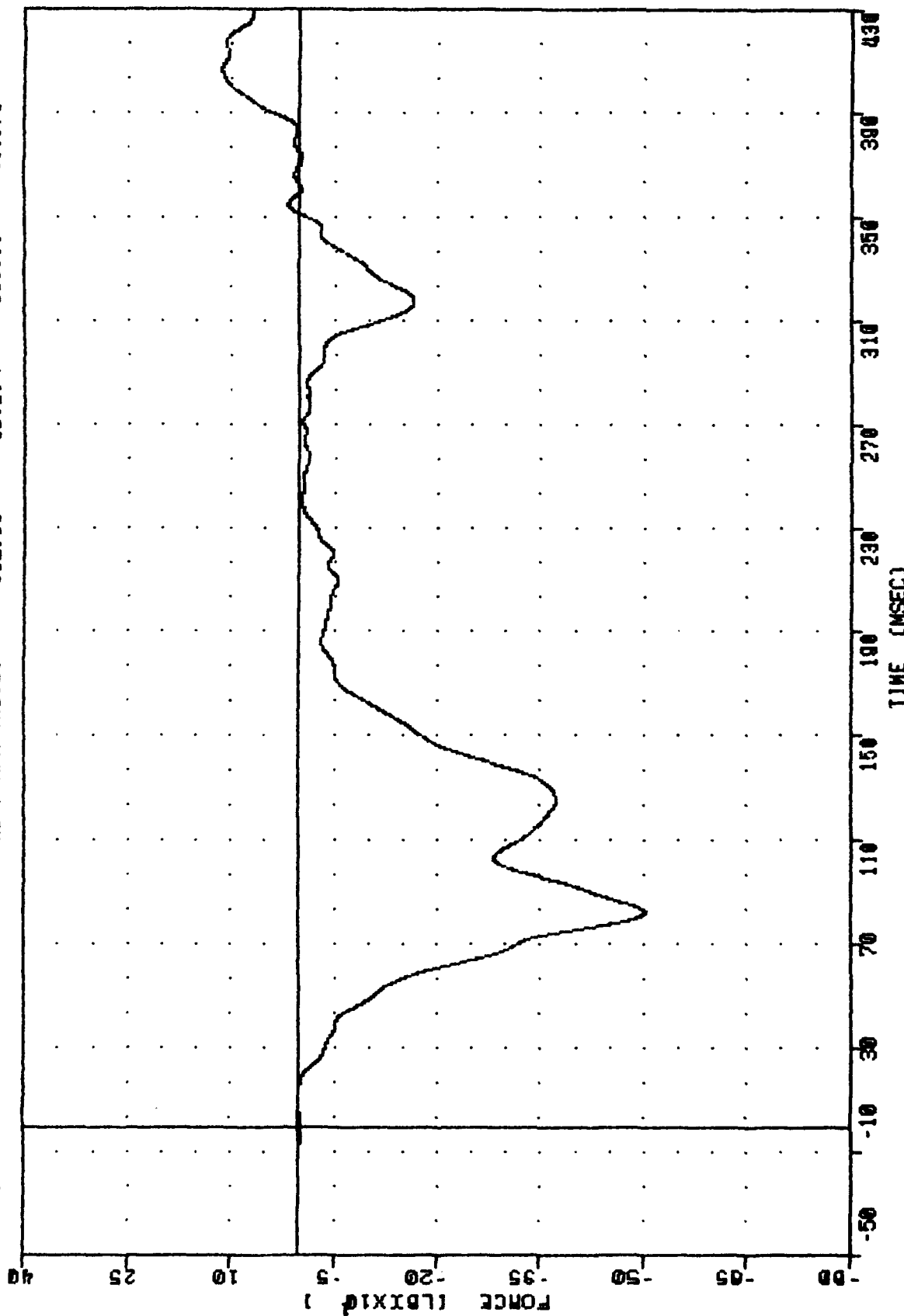
FILTER - BLPF 100/ 316/ -40

MIN, MAX VALUES : -502.65v

82.25,

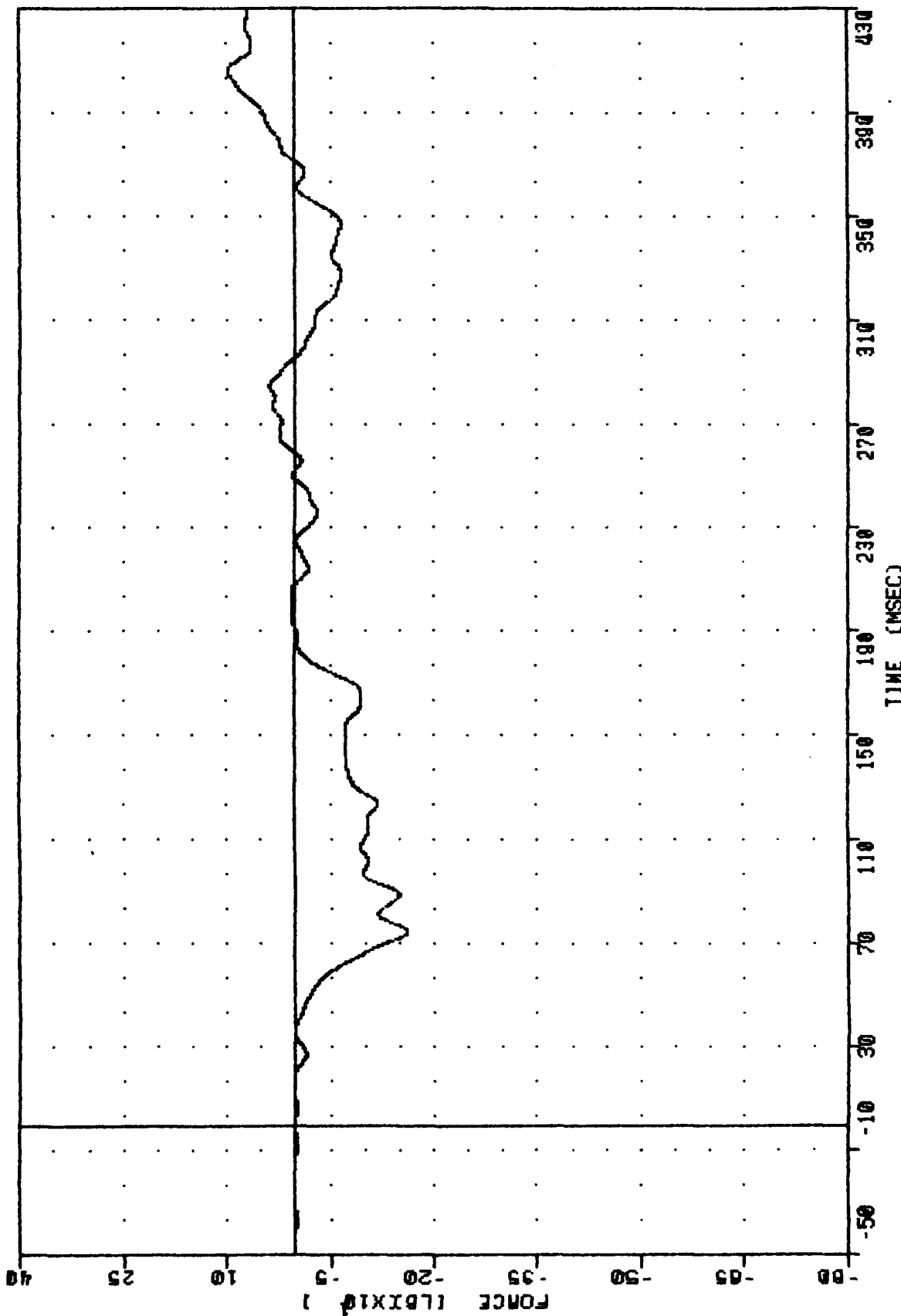
113.51 v

406.75



OVERHEAD LUGGAGE BIN B.BG DYNAMIC TEST
BIN B TURNBUCKLE 178 FORCE

FRR
 91024
 71003
 . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -161.56 74.63 97.43 406.23



OVERHEAD LUGGAGE BIN B.B.G DYNAMIC TEST
 BIN B TURNBUCKLE 188 FORCE

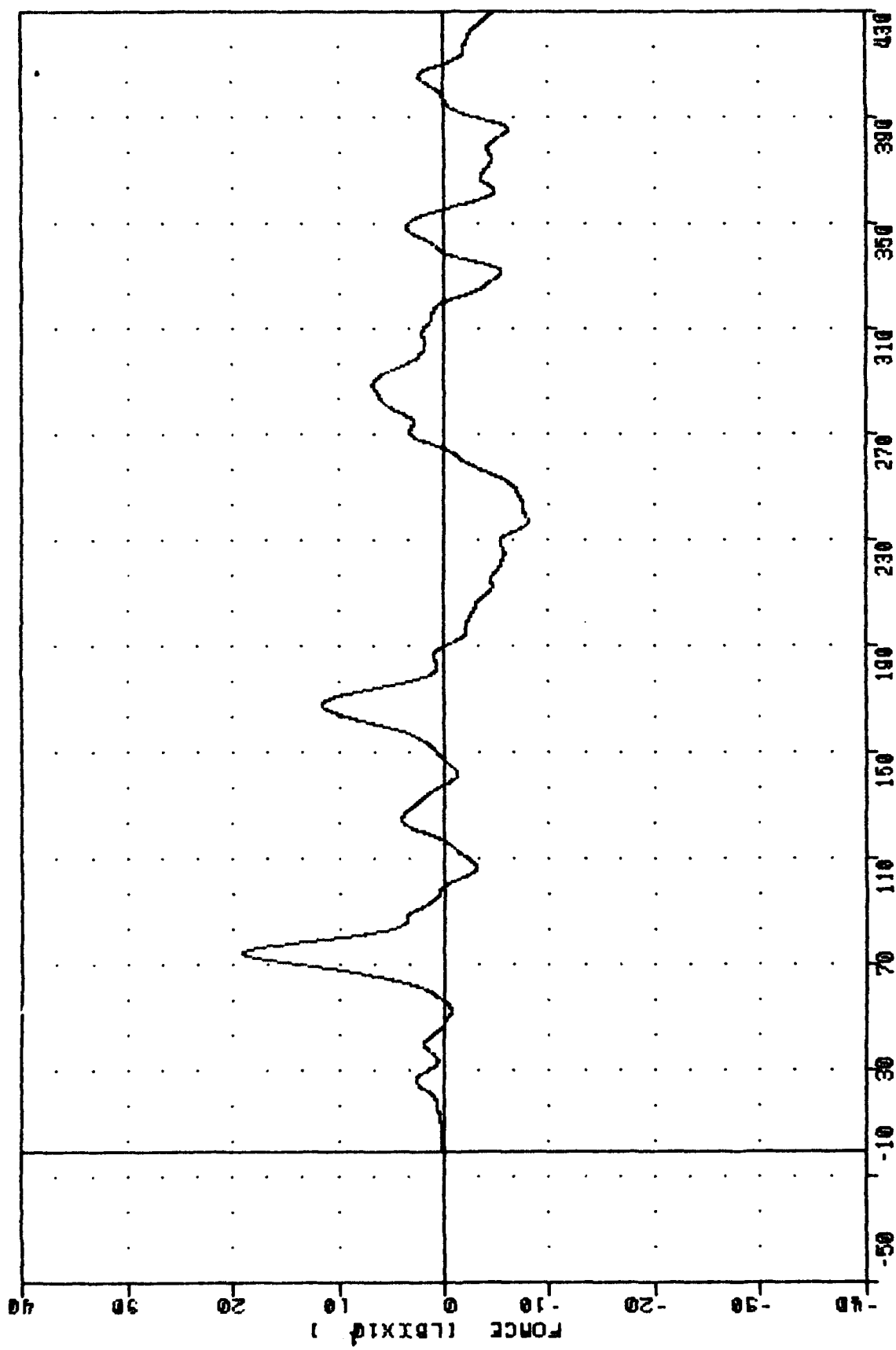
FAR
91024
T2883

. TEST 002

. OVERHEAD LUGGAGE BIN TEST

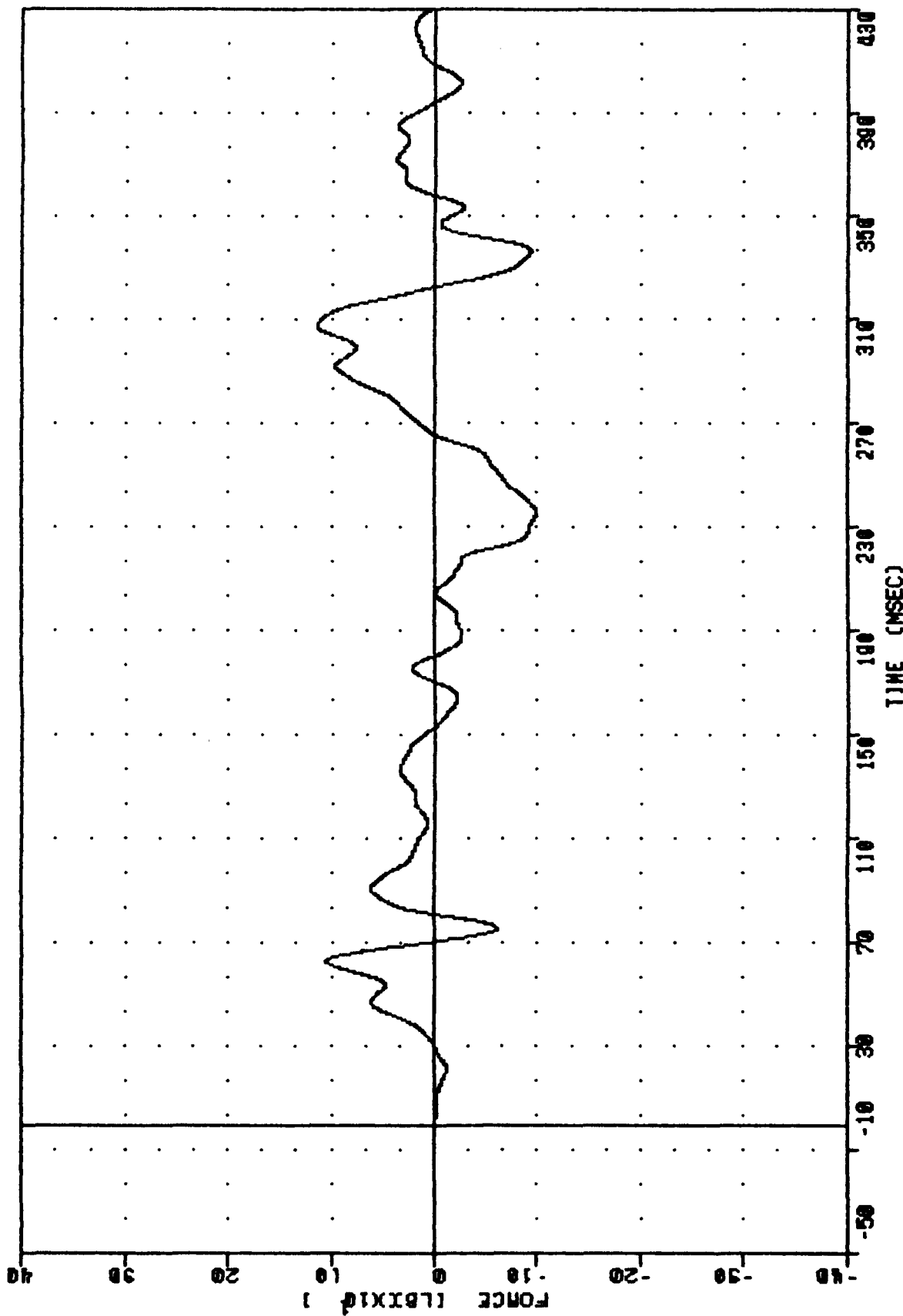
FILTER - BLPF 100/ 316/ -40

MIN, MAX VALUES : -79.69 237.25, 190.49 74.50



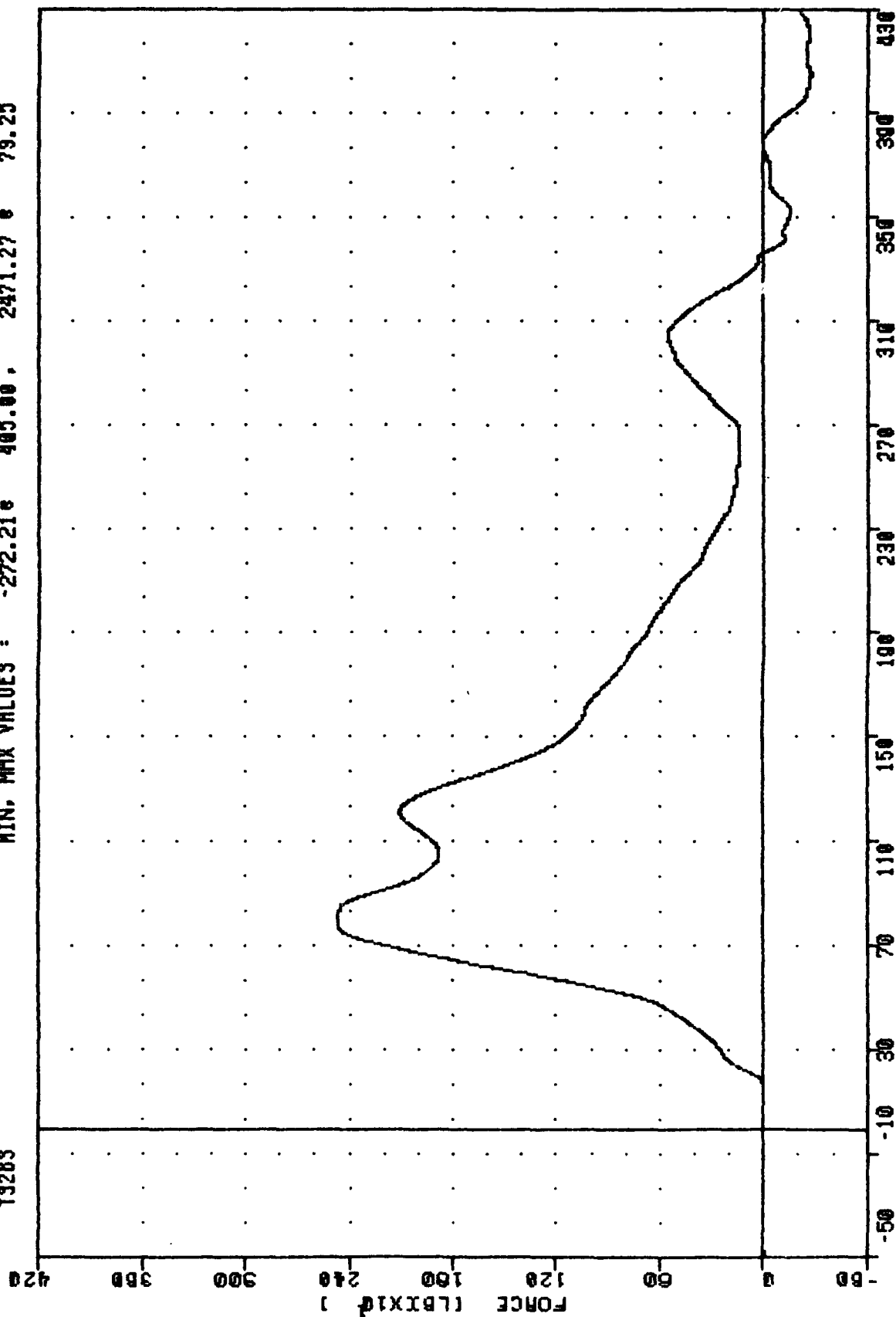
OVERHEAD LUGGAGE BIN 8.8G DYNAMIC TEST
BIN 8 TURNBUCKLE 288 FORCE

FRR
 91024
 T2503
 . TEST 002
 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -98.558 235.75. 113.07 307.75



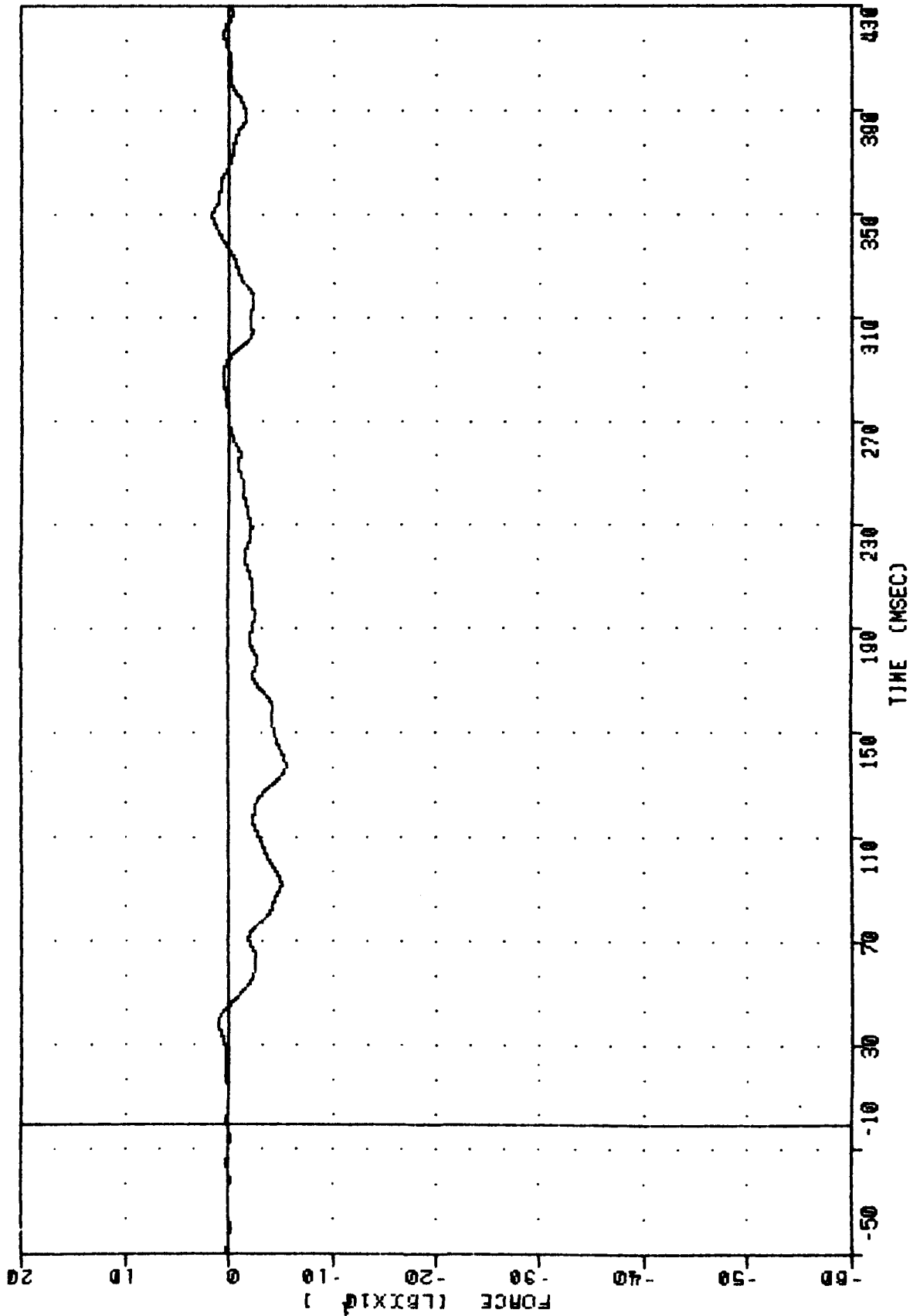
OVERHEAD LUGGAGE BIN 8.8G DYNAMIC TEST
 BIN 8 TURNBUCKLE 258 FORCE

FRA . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 91024 FILTER - BLPF 100/ 316/ -40
 13283 MIN, MAX VALUES : -272.218 403.00, 2471.27 8 79.23



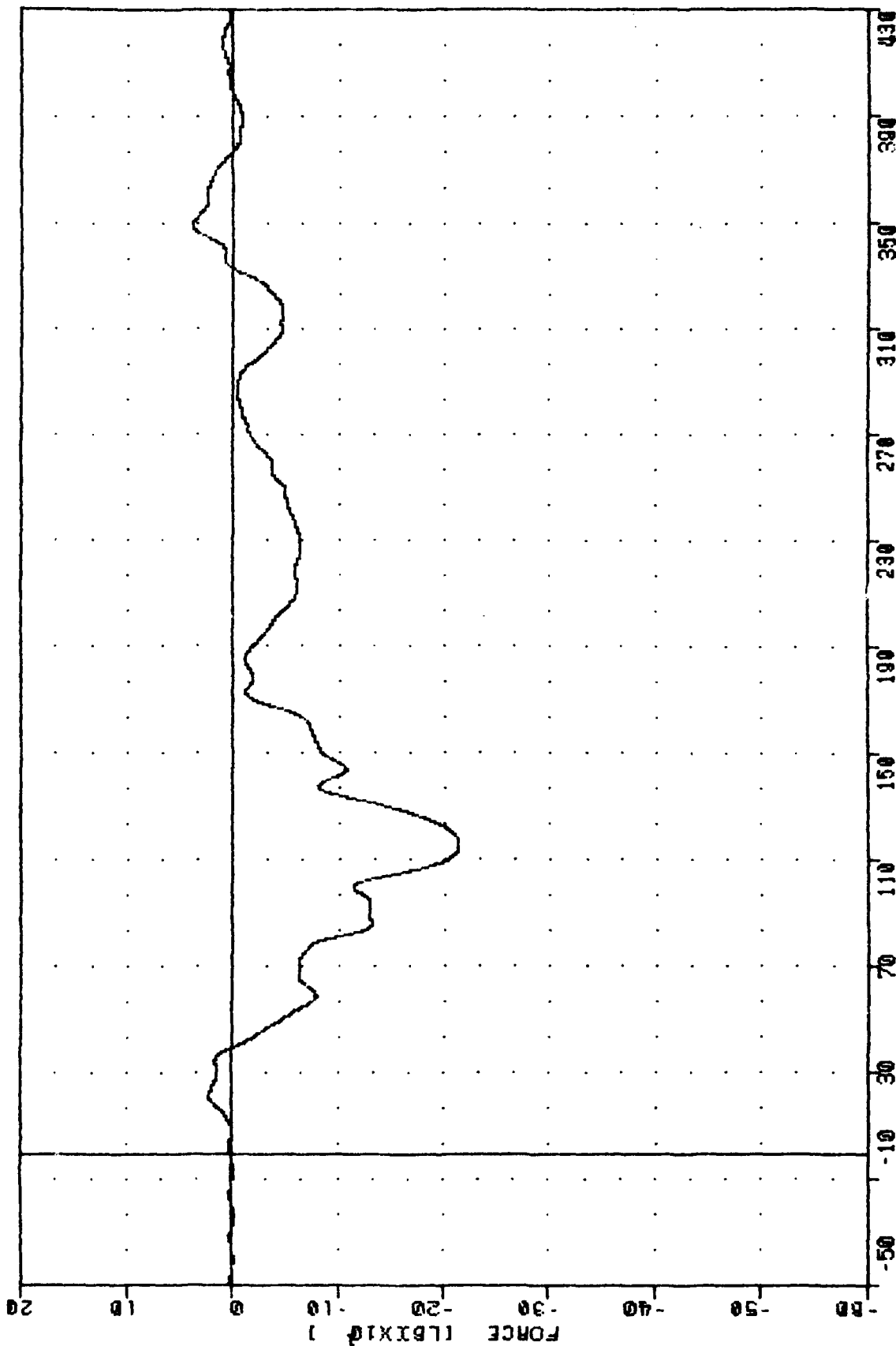
OVERHEAD LUGGAGE BIN B.BG DYNAMIC TEST
 BIN B TURNBUCKLE 328 FORCE

FRA 91024 TSHS
 . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -55.46e 137.75, 18.29 e 349.75



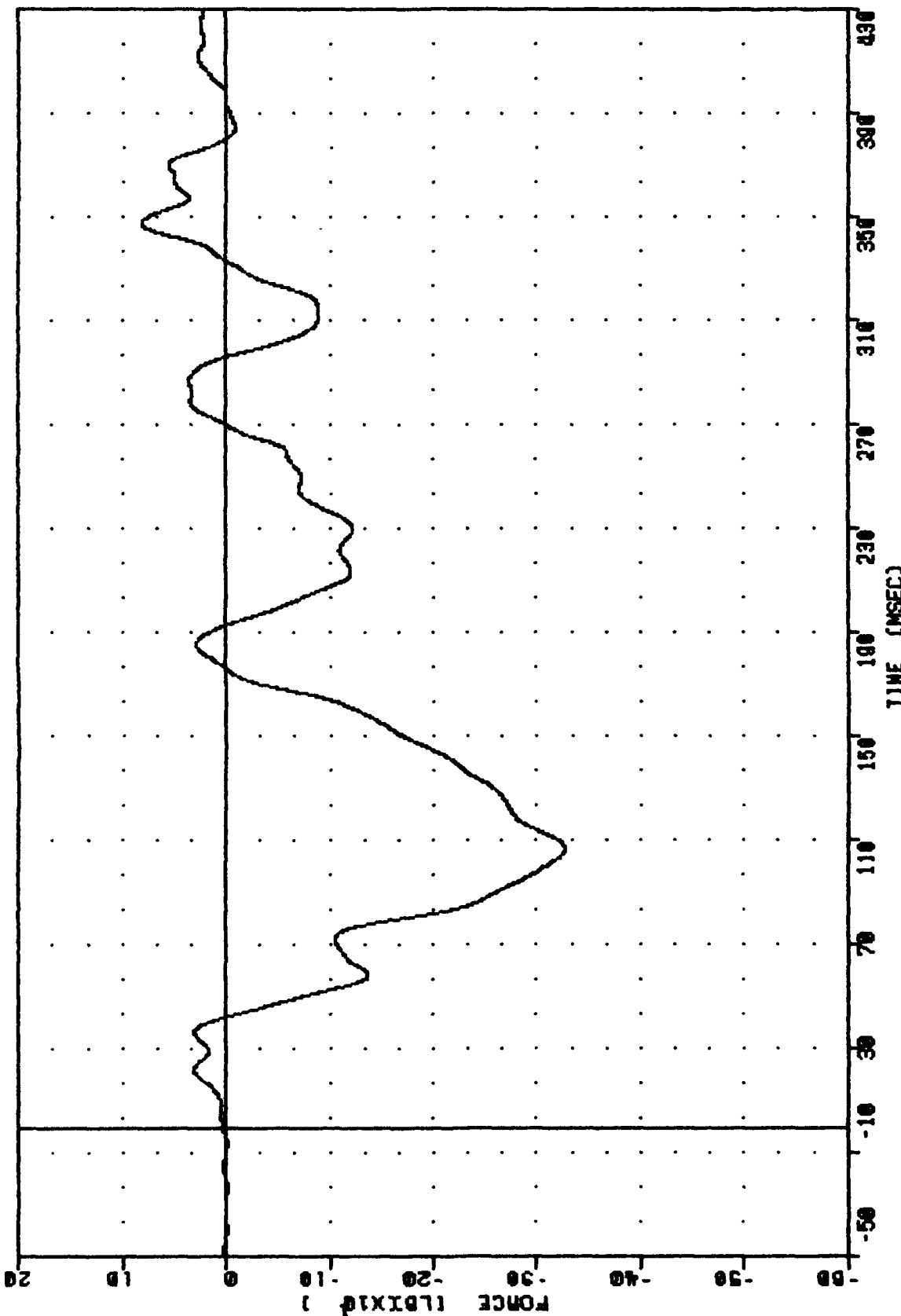
OVERHEAD LUGGAGE BIN B.BG DYNAMIC TEST
 BIN A TURNBUCKLE 3H FORCE

FRA . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 91024 FILTER - BLPF 100/ 316/ -40
 T4H3 MIN, MAX VALUES : -212.56 115.13 , 39.06 349.56



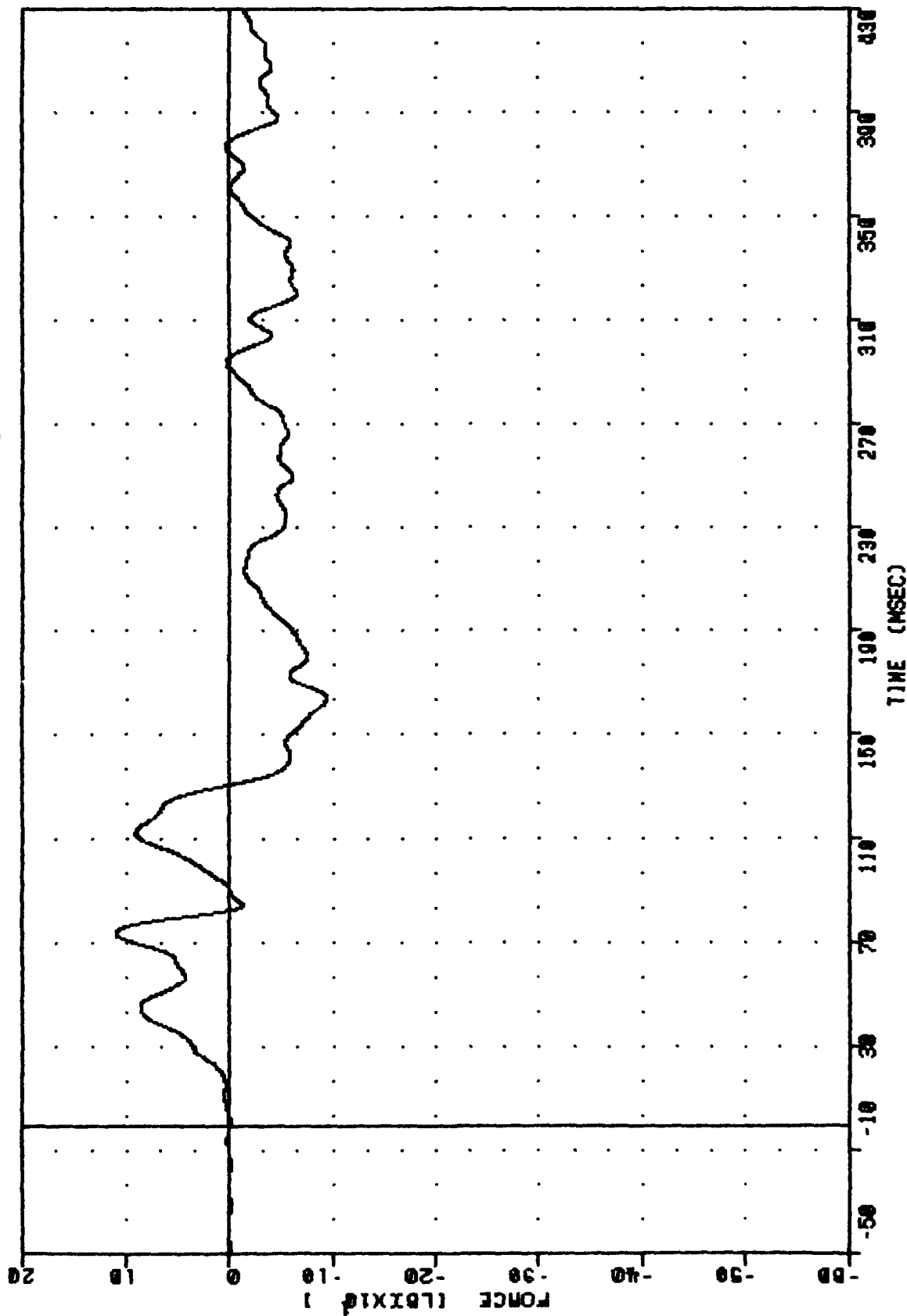
OVERHEAD LUGGAGE BIN B. BG DYNAMIC TEST
 BIN A TURNBUCKLE 4H FORCE

FRA 81024 TEST 002 OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -327.10 106.88 , 81.53 347.85



OVERHEAD LUGGAGE BIN B.B. DYNAMIC TEST
 BIN A TURNBUCKLE 5H FORCE

FRA 91024 TONS
 . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -94.55 104.00 , 109.10 74.00



OVERHEAD LUGGAGE BIN B. BG DYNAMIC TEST
 BIN A TURNBUCKLE 6H FORCE

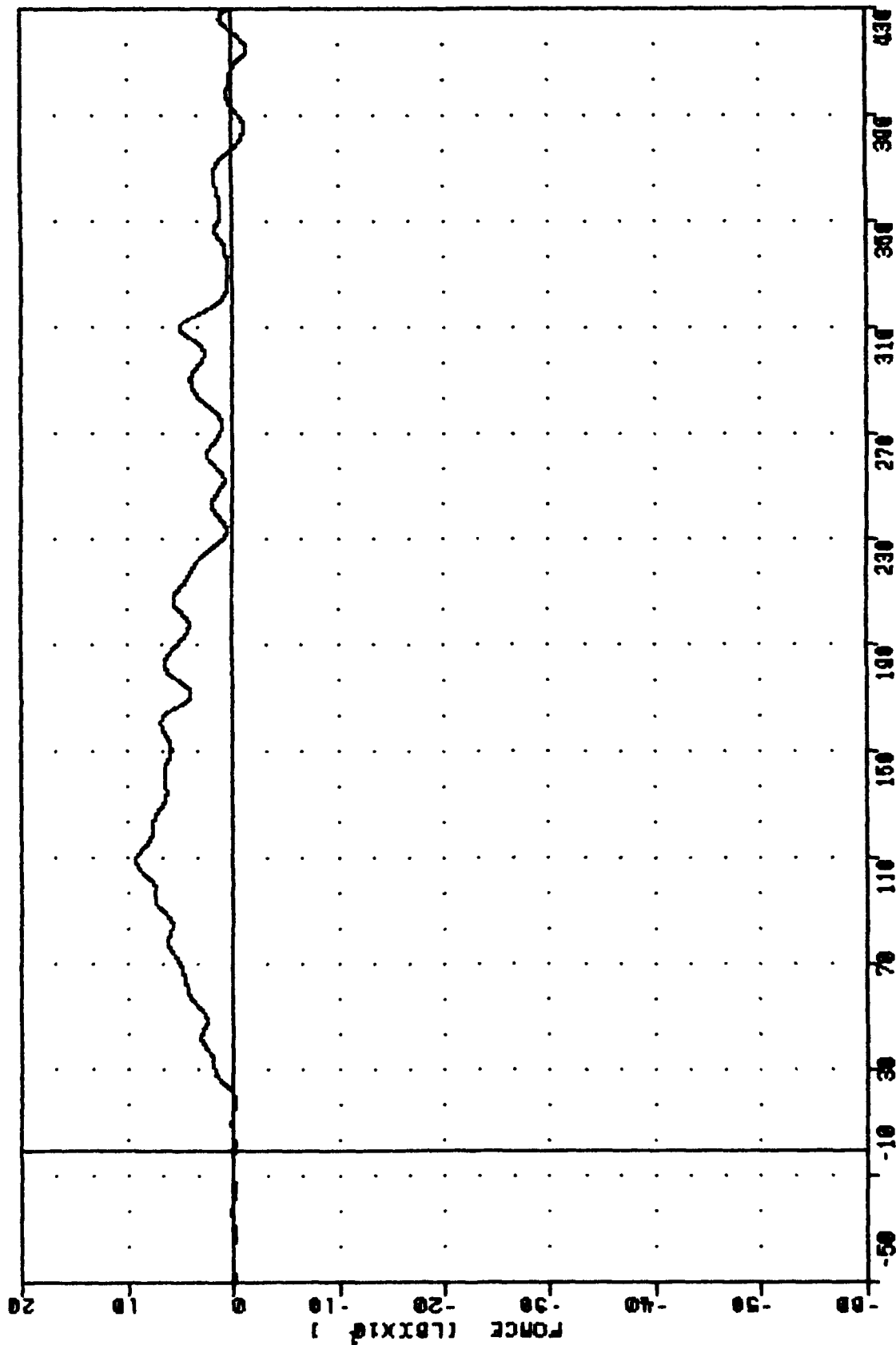
FAA
91024
72H3

TEST 002

OVERHEAD LUGGAGE BIN TEST

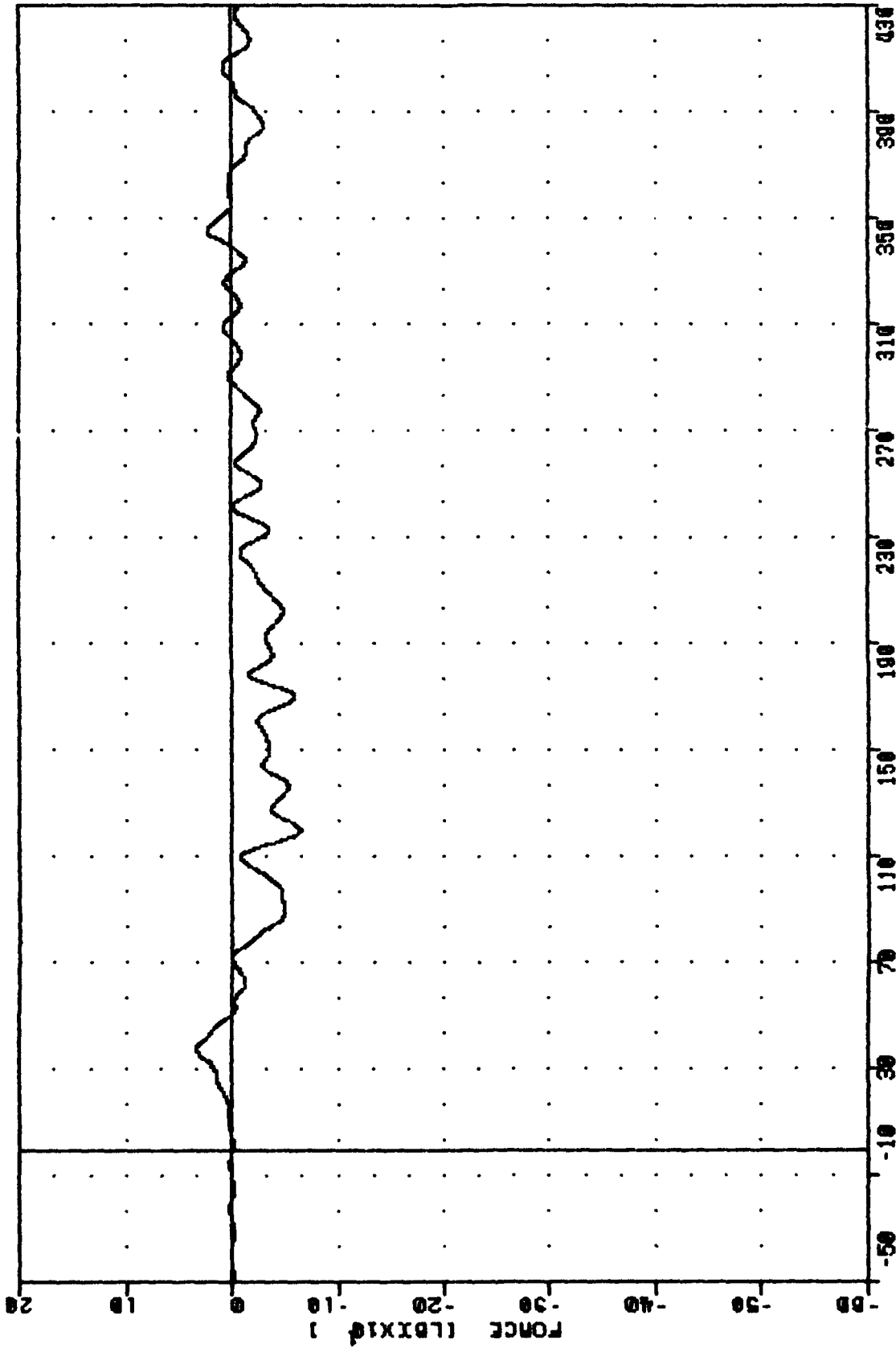
FILTER - BLPF 100/ 316/ -40

MIN, MAX VALUES : -14.800 415.00 , 91.69 e 109.50



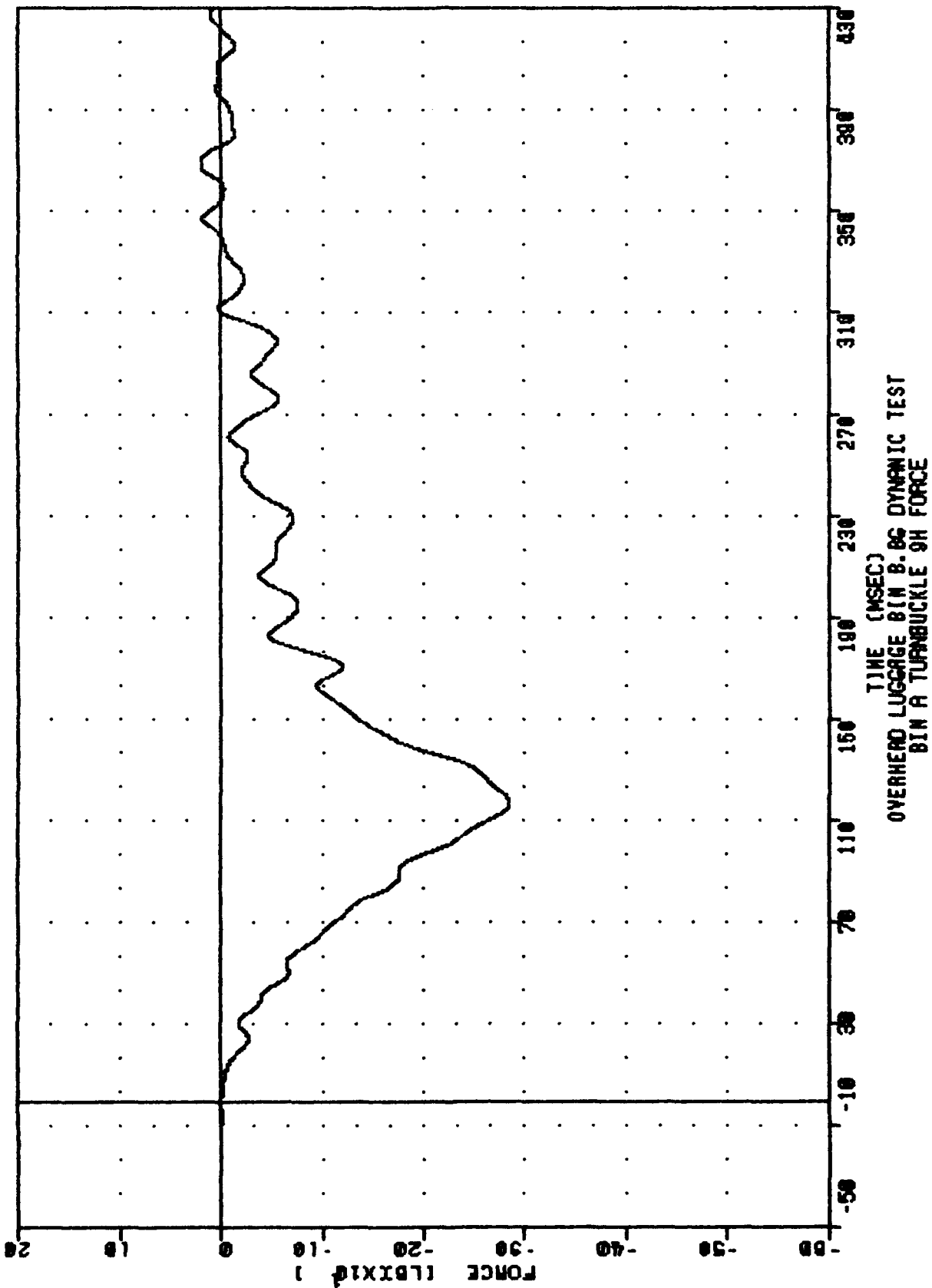
OVERHEAD LUGGAGE BIN B.66 DYNAMIC TEST
BIN A TURBUCKLE 7H FORCE

FAA . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 91024 FILTER - BLPF 100/ 316/ -40
 TONS MIN, MAX VALUES : -63.08 120.13 , 33.07 37.83

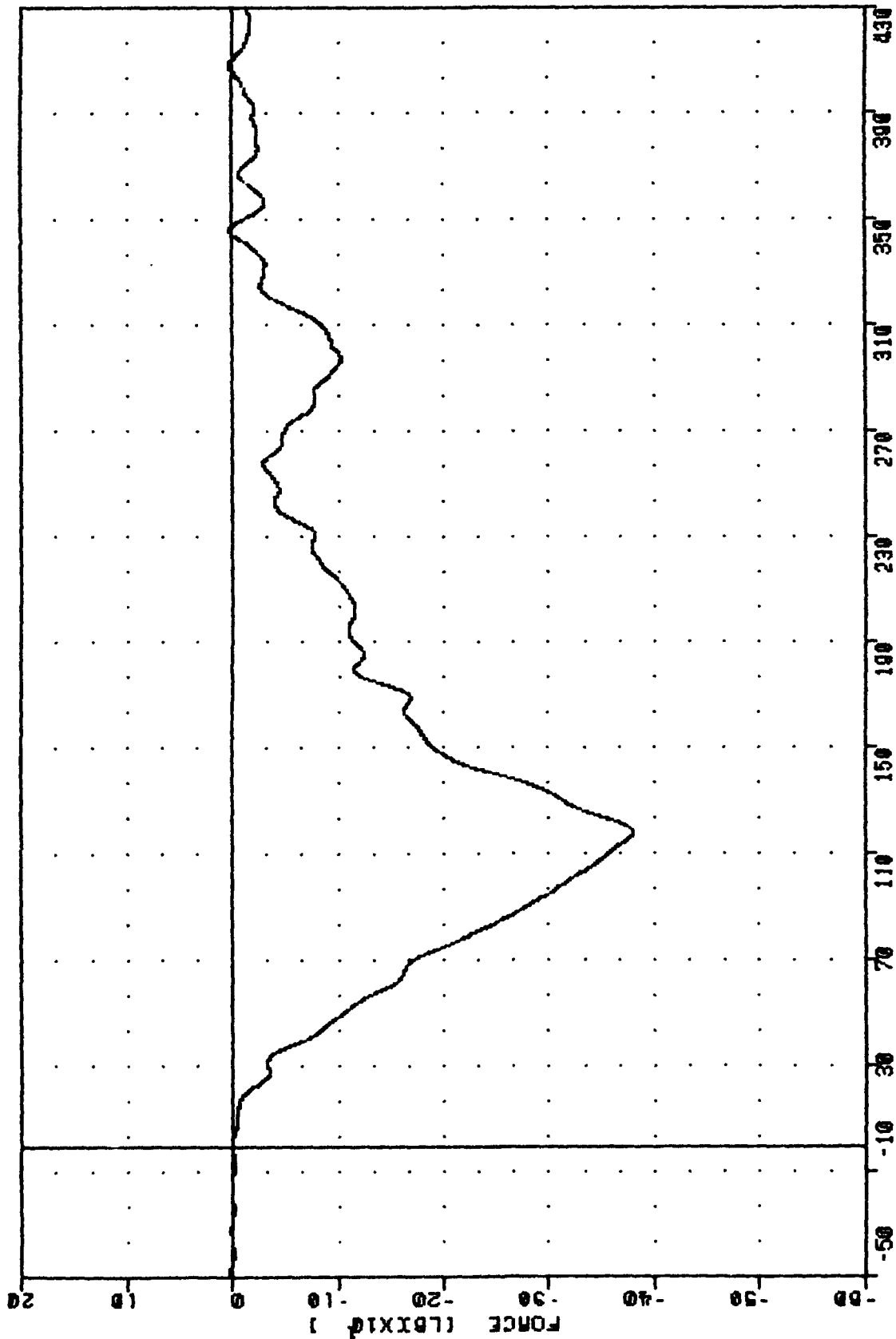


OVERHEAD LUGGAGE BIN B.B. DYNAMIC TEST
 BIN A TURNBUCKLE 8H FORCE

FRA . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 91024 FILTER - BLPF 100/ 316/ -40
 T9H3 MIN, MAX VALUES -283.99 117.13, 20.33 368.00

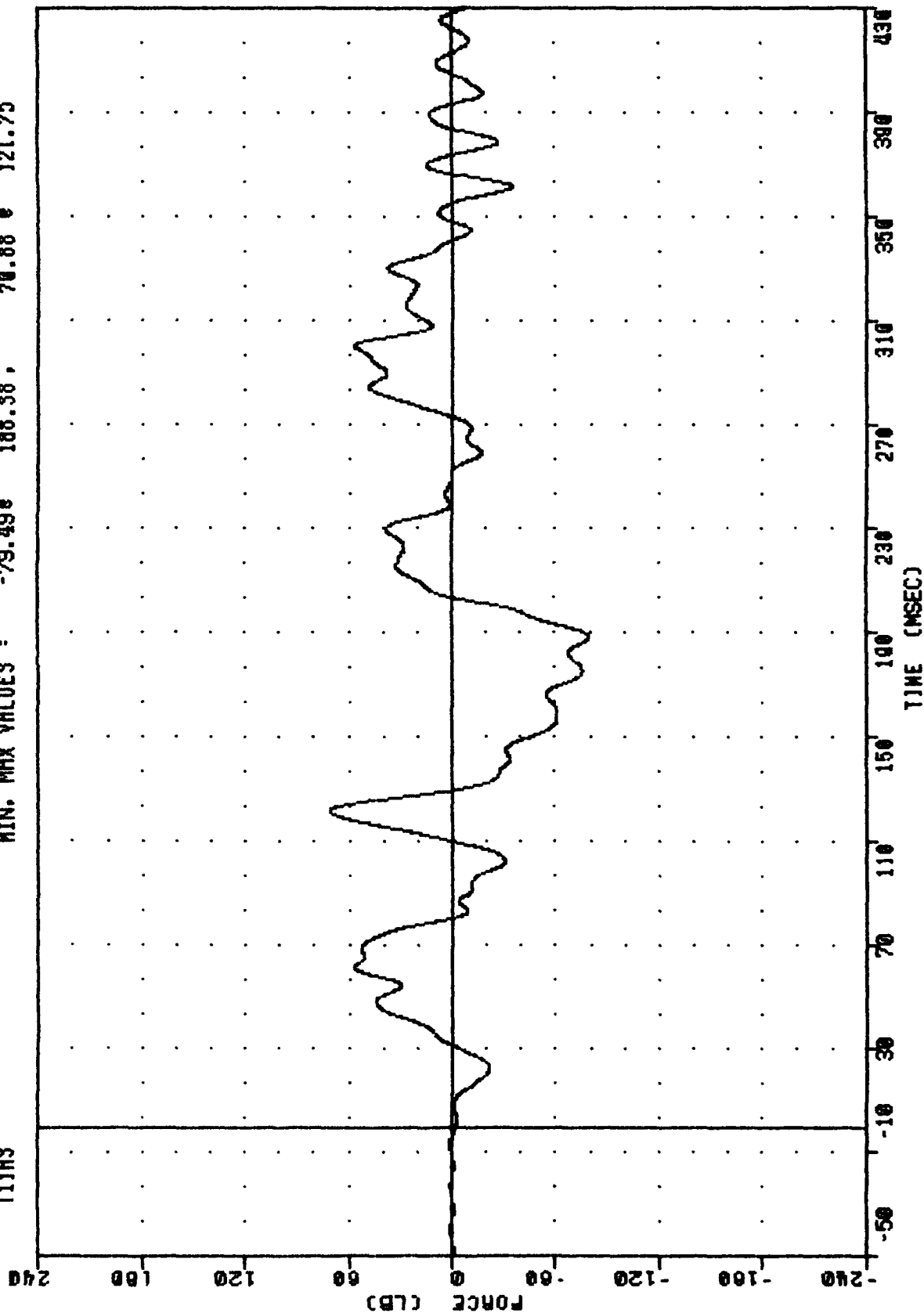


FAR 91024 710H3
 . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -379.498 118.00, 2.77 400.00



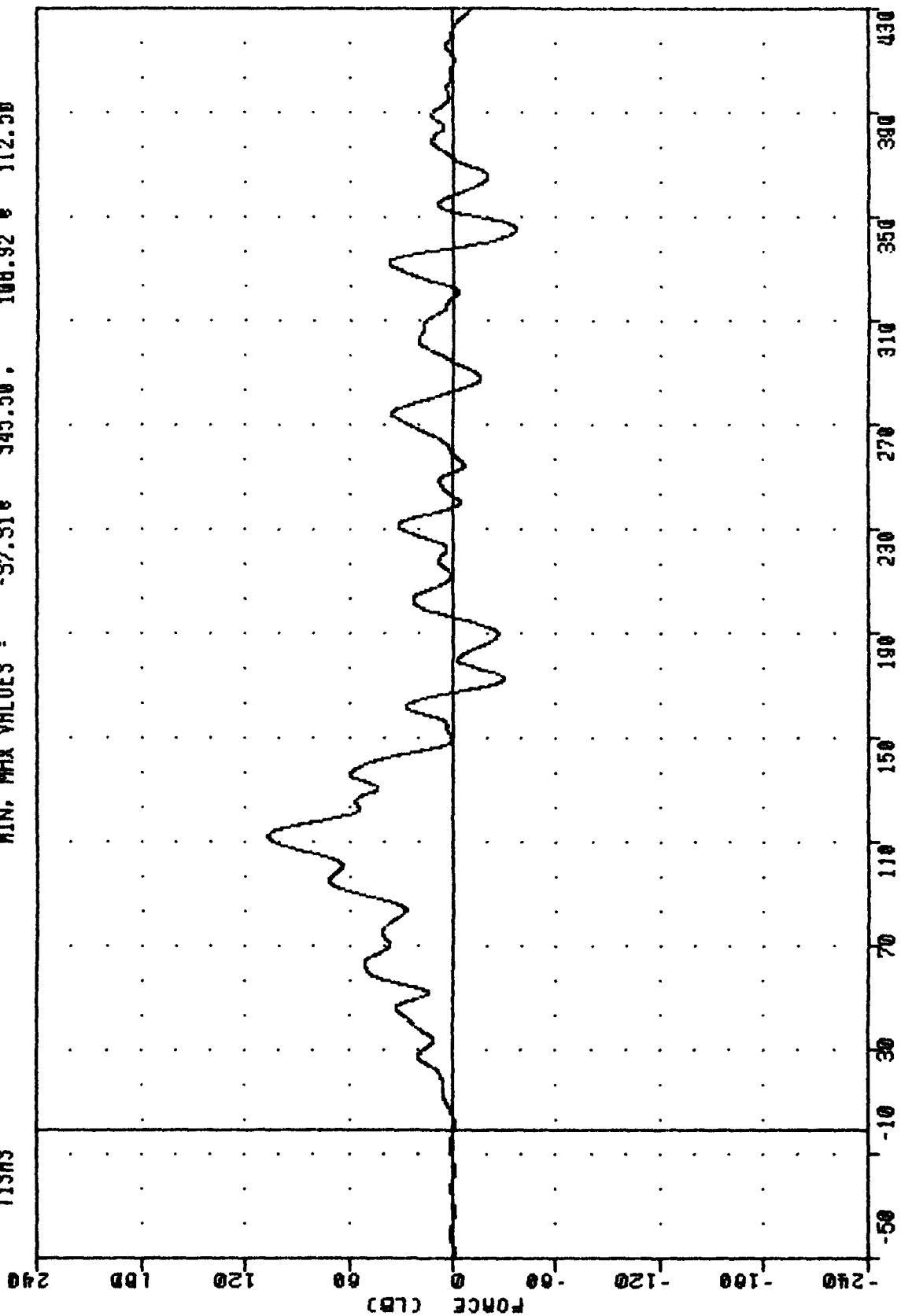
TIME (MSEC)
 OVERHEAD LUGGAGE BIN B.8G DYNAMIC TEST
 BIN A TURNBUCKLE 10H FORCE

FRR
 91024
 T11H3
 . TEST 002
 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -79.49e 188.38e 70.88 e 121.75



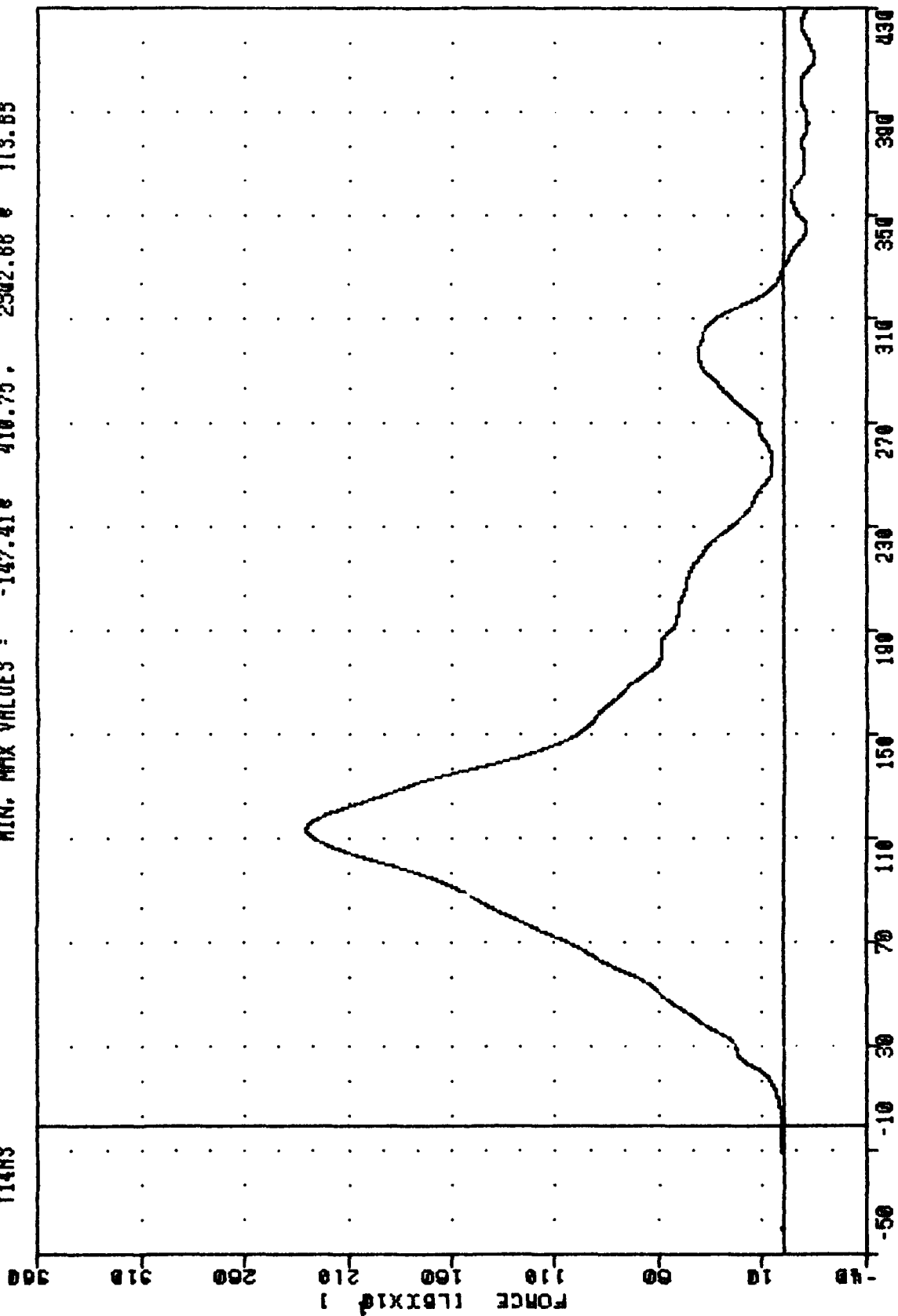
OVERHEAD LUGGAGE BIN 8.BG DYNAMIC TEST
 BIN A TURNBUCKLE 11H FORCE

FAR 91024 713H3 . TEST 0002 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES = -97.31 345.50, 100.92 112.50



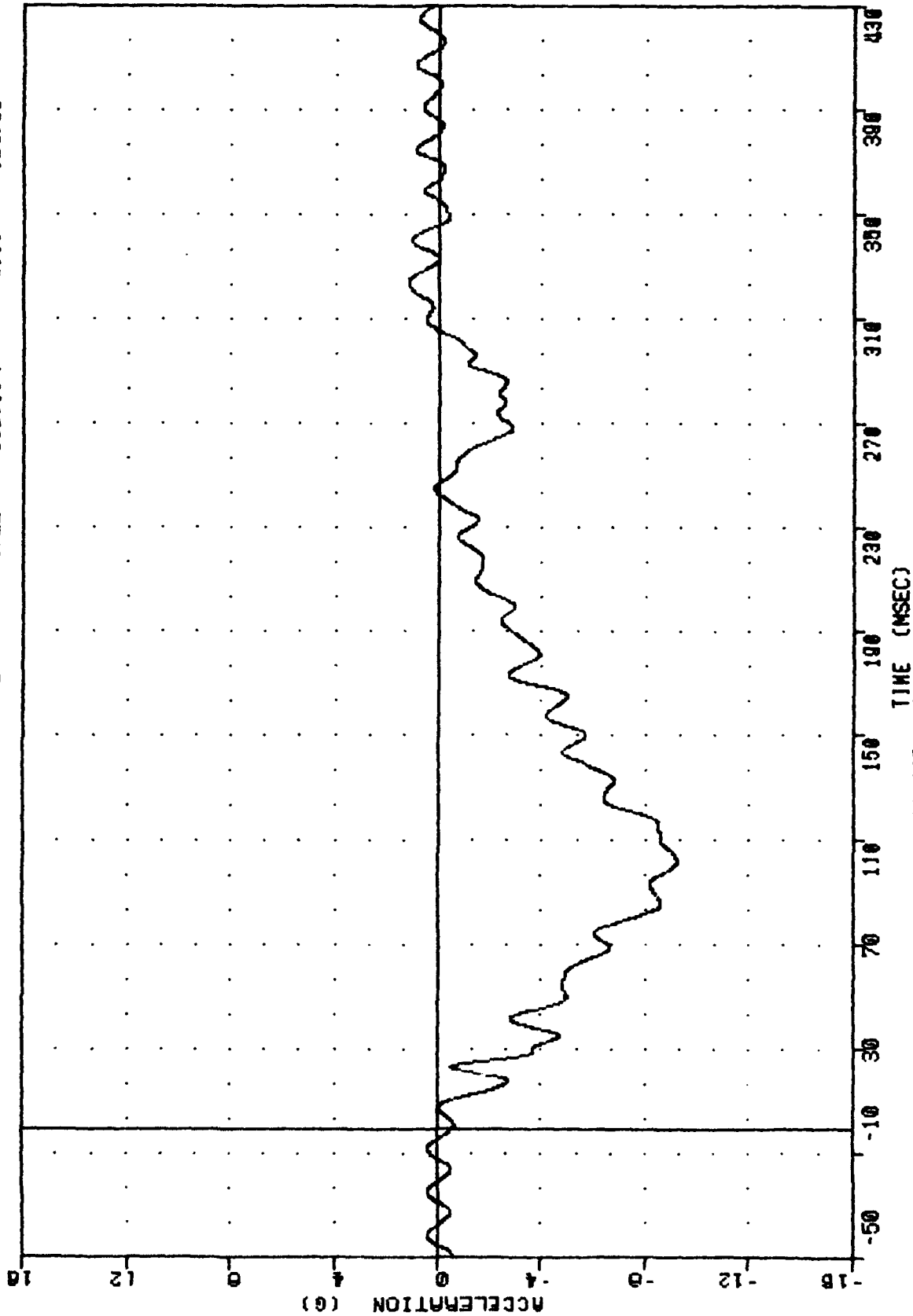
OVERHEAD LUGGAGE BIN B. BG DYNAMIC TEST
 BIN A TURNBUCKLE 13H FORCE

FRR
 91024
 T14NS
 . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 FILTER - 8LPF 100/ 316/ -40
 MIN. MAX VALUES : -147.41e 410.75, 2502.66 e 113.65



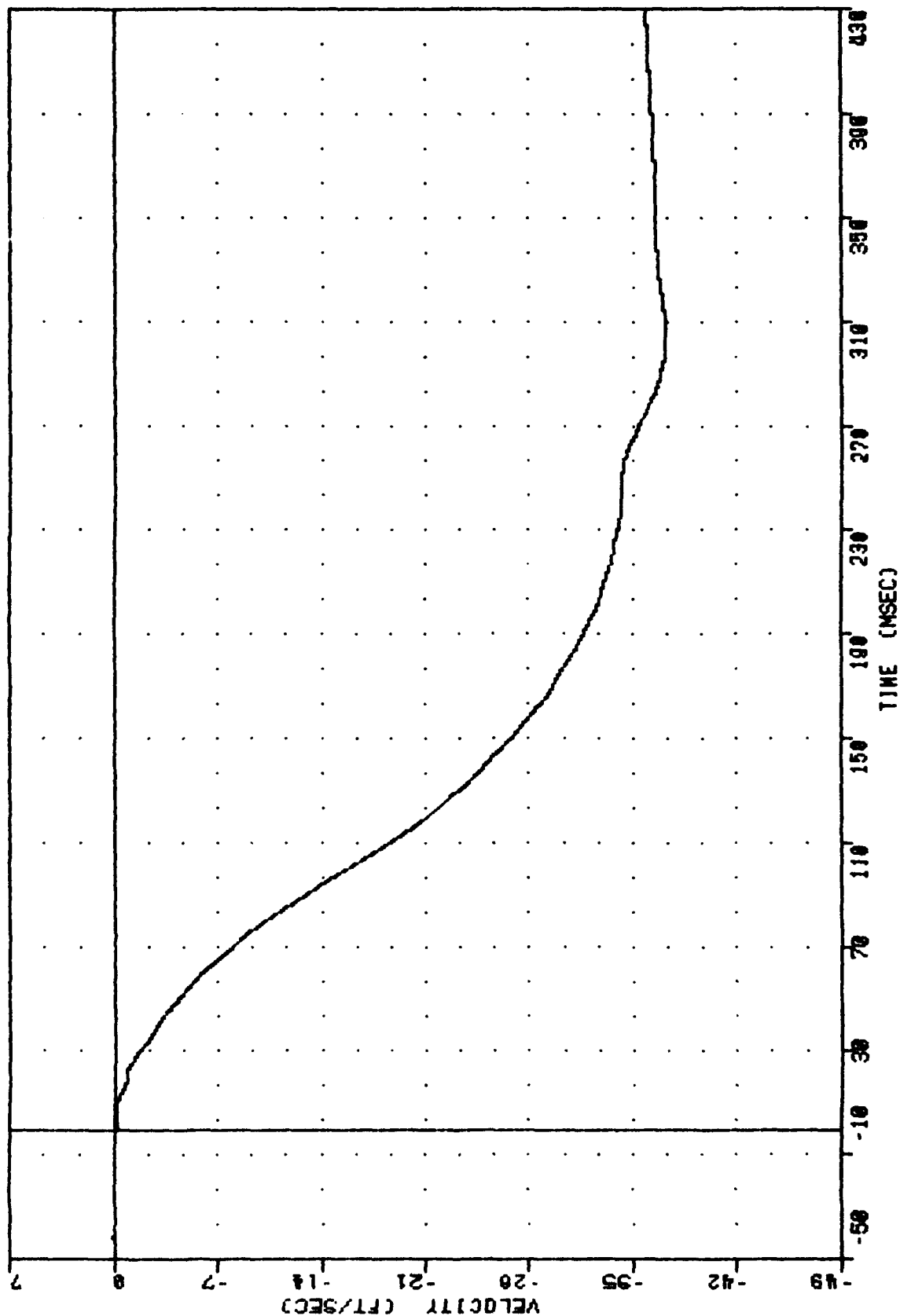
TIME (MSEC)
 OVERHEAD LUGGAGE BIN 8.8G DYNAMIC TEST
 BIN A TURNBUCKLE 14H FORCE

FRA
 91024
 FLFX6
 . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -9.22 102.00 , 1.16 924.85



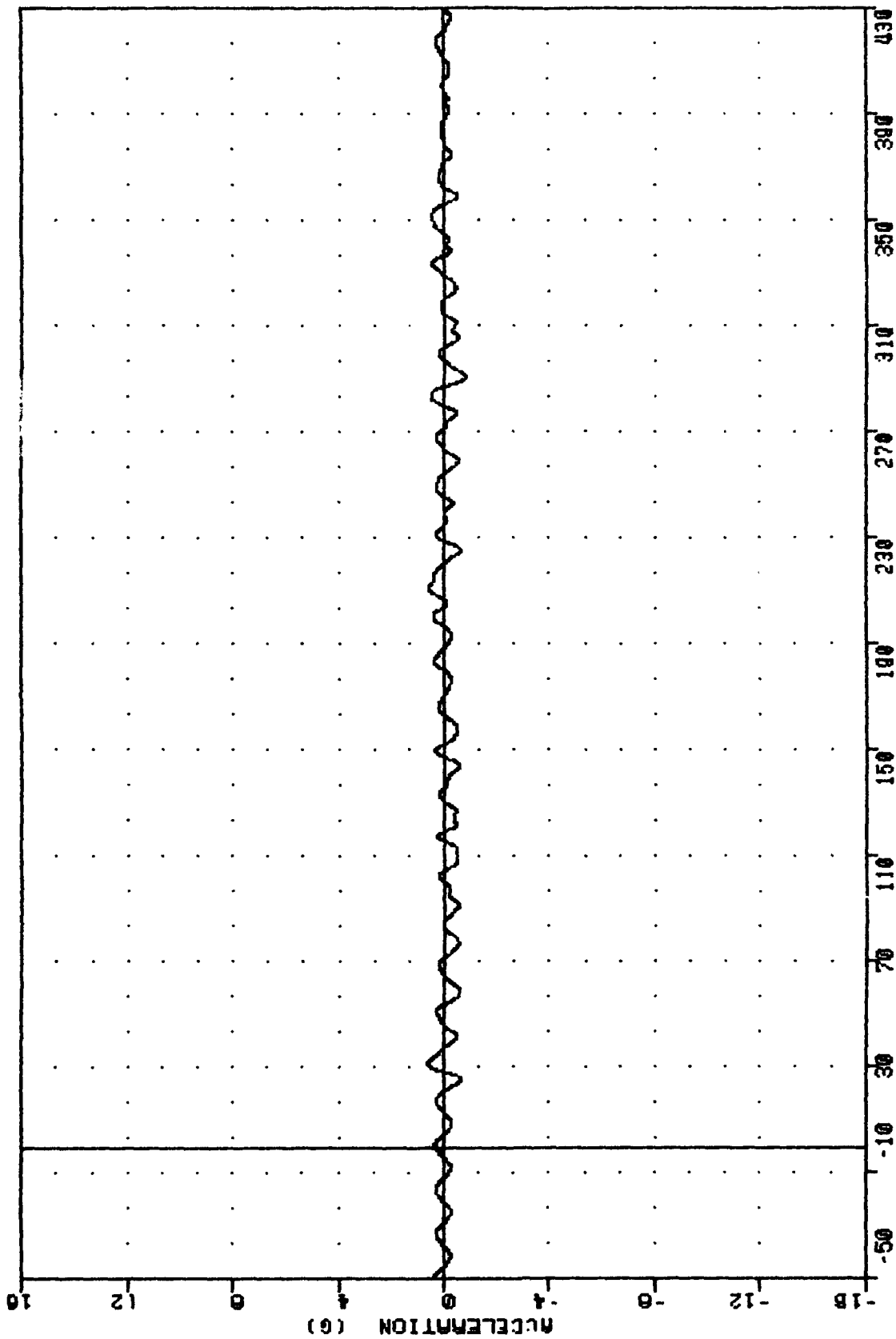
OVERHEAD LUGGAGE BIN B.BG DYNAMIC TEST
 FLOOR FORWARD LONGITUDINAL ACCELERATION

FRA . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 91024 FILTER - BLPF 300/ 949/ -40
 FLFXV MIN. MAX VALUES : -57.24e 302.25. 0.03 e -41.15



OVERHEAD LUGGAGE BIN B.66 DYNAMIC TEST
 FLOOR FORWARD LONGITUDINAL VELOCITY

FAR . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 91024 FILTER - 8LPE 100/ 316/ -40
 FLFY6 MIN. MAX VALUES : -0.83g 290.88g 0.02g 31.25



OVERHEAD LUGGAGE BIN 8.8g DYNAMIC TEST
 FLOOR FORWARD LATERAL ACCELERATION

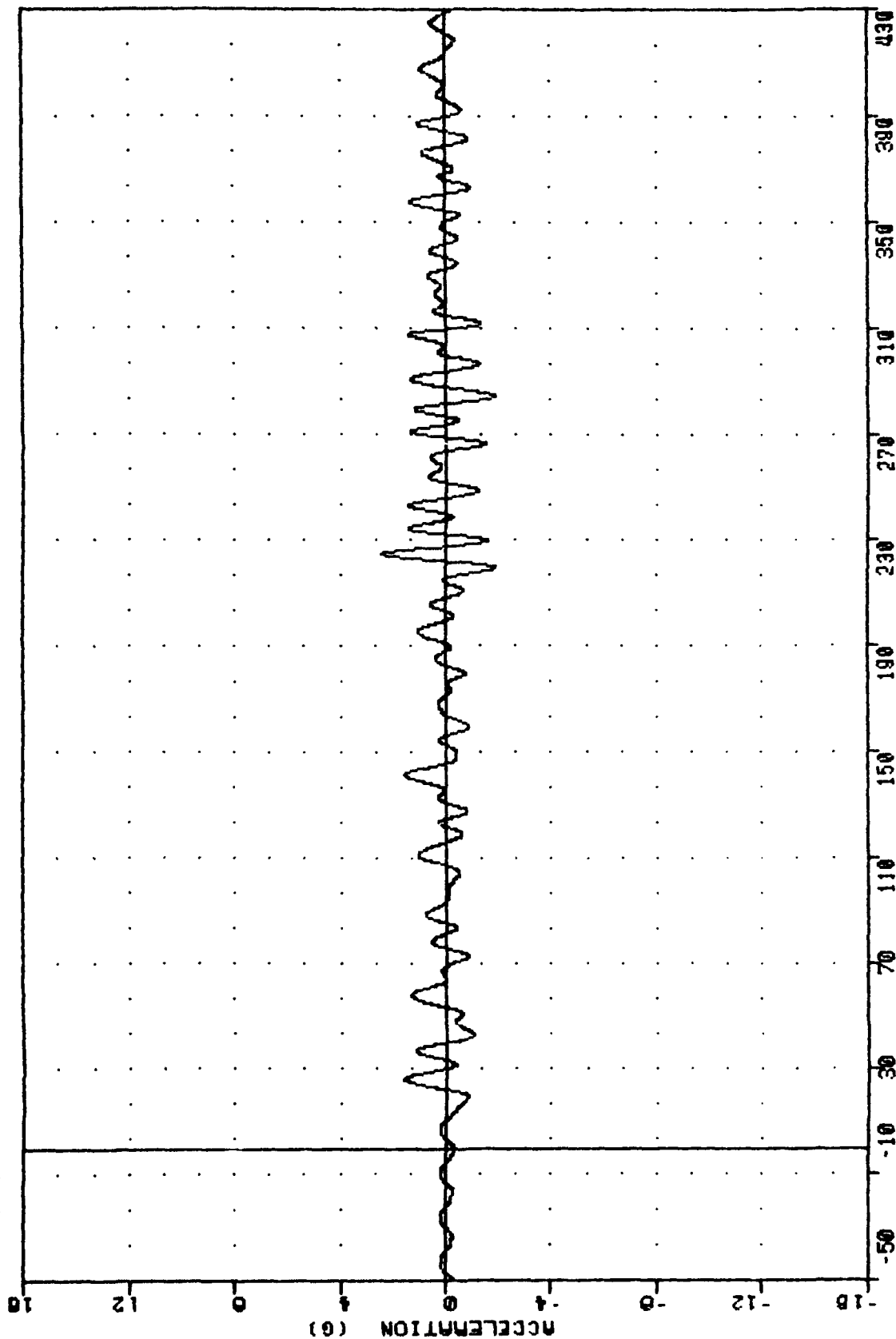
FAR
91024
FLF26

. TEST 002

. OVERHEAD LUGGAGE BIN TEST

FILTER - 8LPF 100/ 316/ -40

MIN. MAX VALUES : -1.87g 284.63. 2.40 g 224.88



TIME (MSEC)
OVERHEAD LUGGAGE BIN 8.8G DYNAMIC TEST
FLOOR FORWARD VERTICAL ACCELERATION

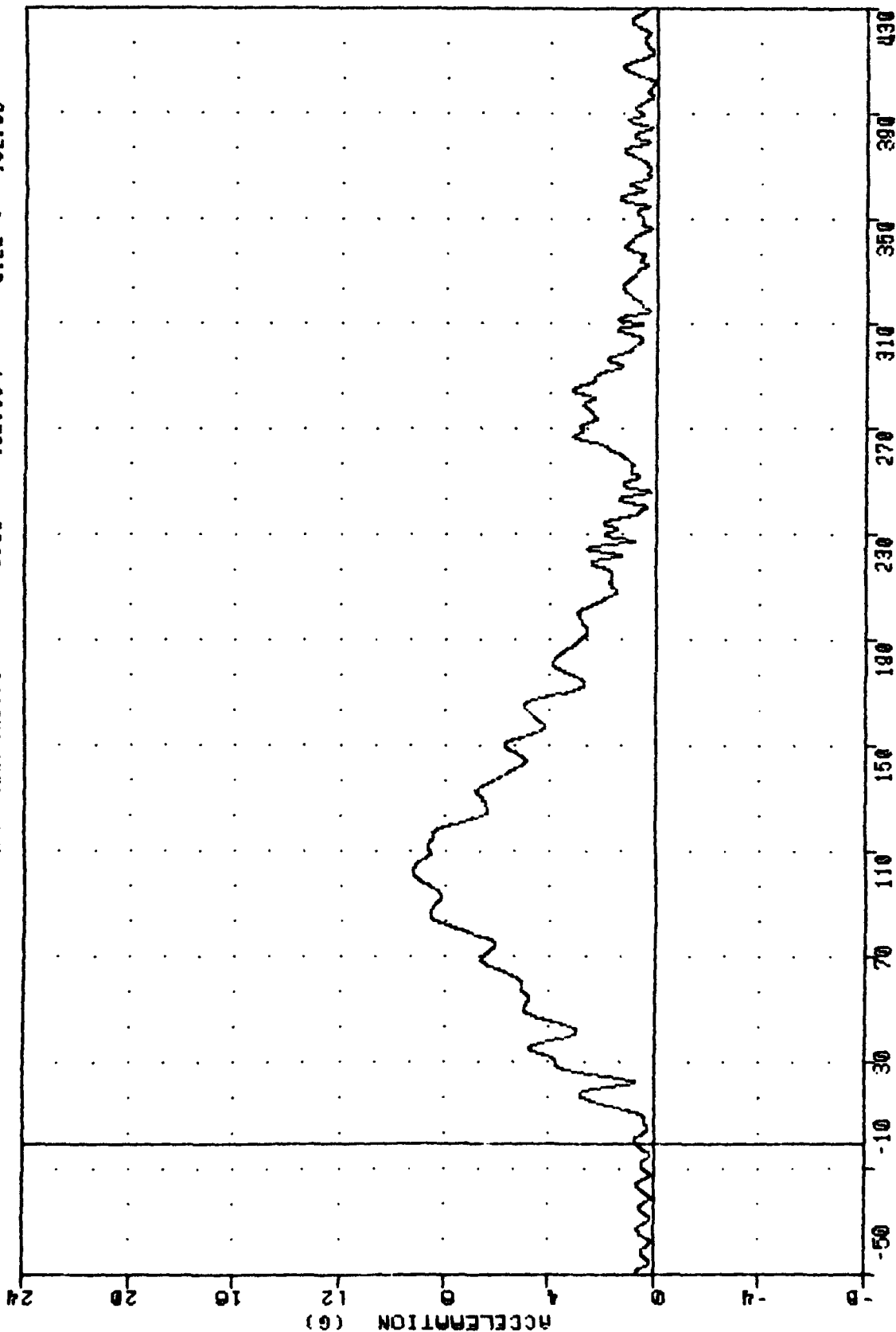
FAR
91024
FLFR6

. TEST 002

. OVERHEAD LUGGAGE BIN TEST

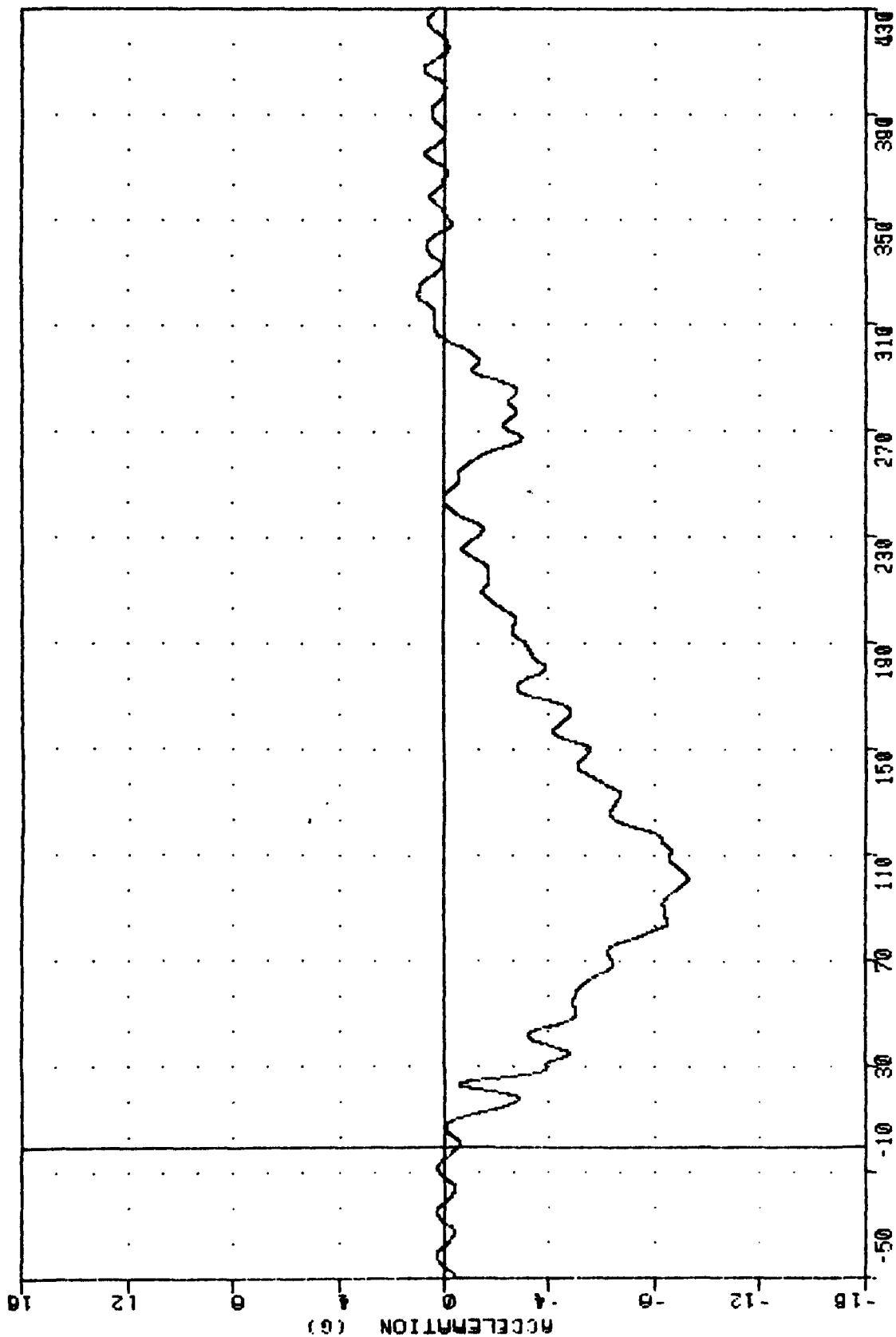
FILTER - 8LPP 100/ 316/ -40

MIN. MAX VALUES : 0.05% 402.00 , 9.22 % 102.00



TIME (MSEC)
OVERHEAD LUGGAGE BIN 8.8G DYNAMIC TEST
FLOOR FORWARD RESULTANT ACCELERATION

FRA 91024
 FLAX6
 . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -9.29g 101.50, 1.01 g 321.00



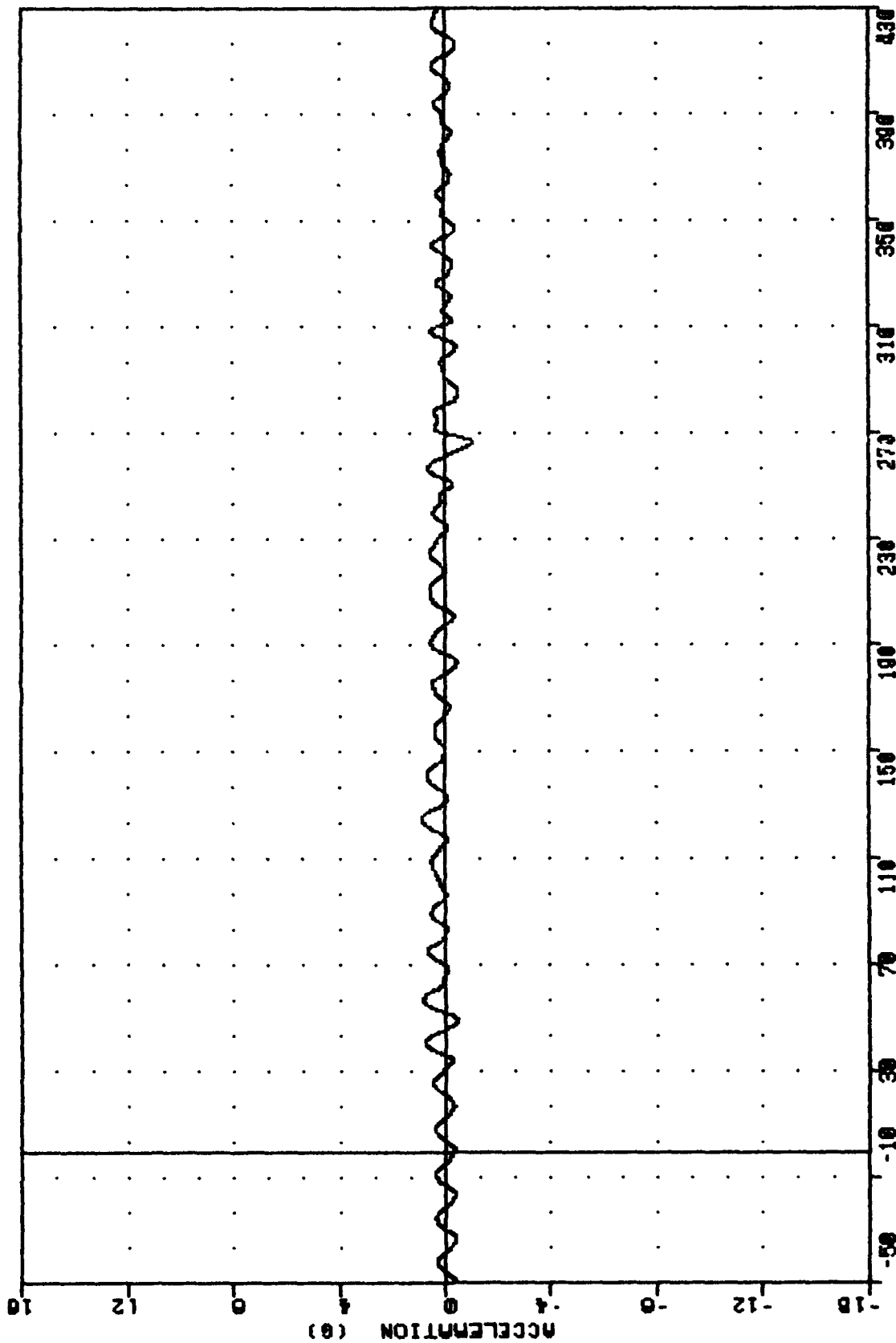
OVERHEAD LUGGAGE BIN 8.8G DYNAMIC TEST
 FLOOR AFT LONGITUDINAL ACCELERATION

FAR 91024
 FLAXY
 . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 300/ 949/ -40
 MIN. MAX VALUES : -57.53 300.63, 0.03 41.00



TIME (MSEC)
 OVERHEAD LUGGAGE BIN B.C. DYNAMIC TEST
 FLOOR AFT LONGITUDINAL VELOCITY

FRA 91024
 TEST 002
 OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -1.05e 200.63. 0.87 e 125.00



TIME (MSEC)
 OVERHEAD LUGGAGE BIN 8.0G DYNAMIC TEST
 FLOOR AFT LATERAL ACCELERATION

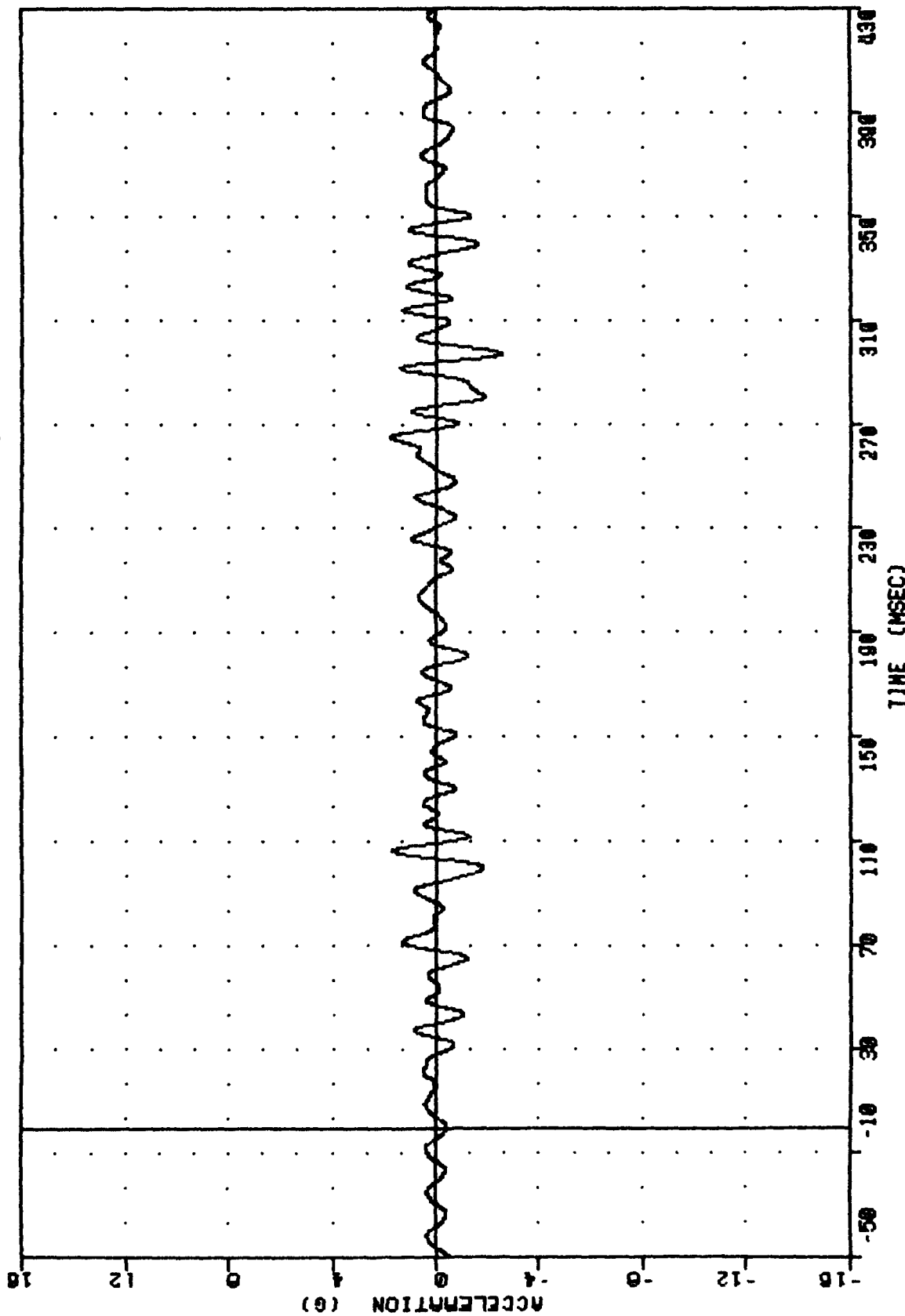
FAR
91024
FL026

• TEST 002

• OVERHEAD LUGGAGE BIN TEST

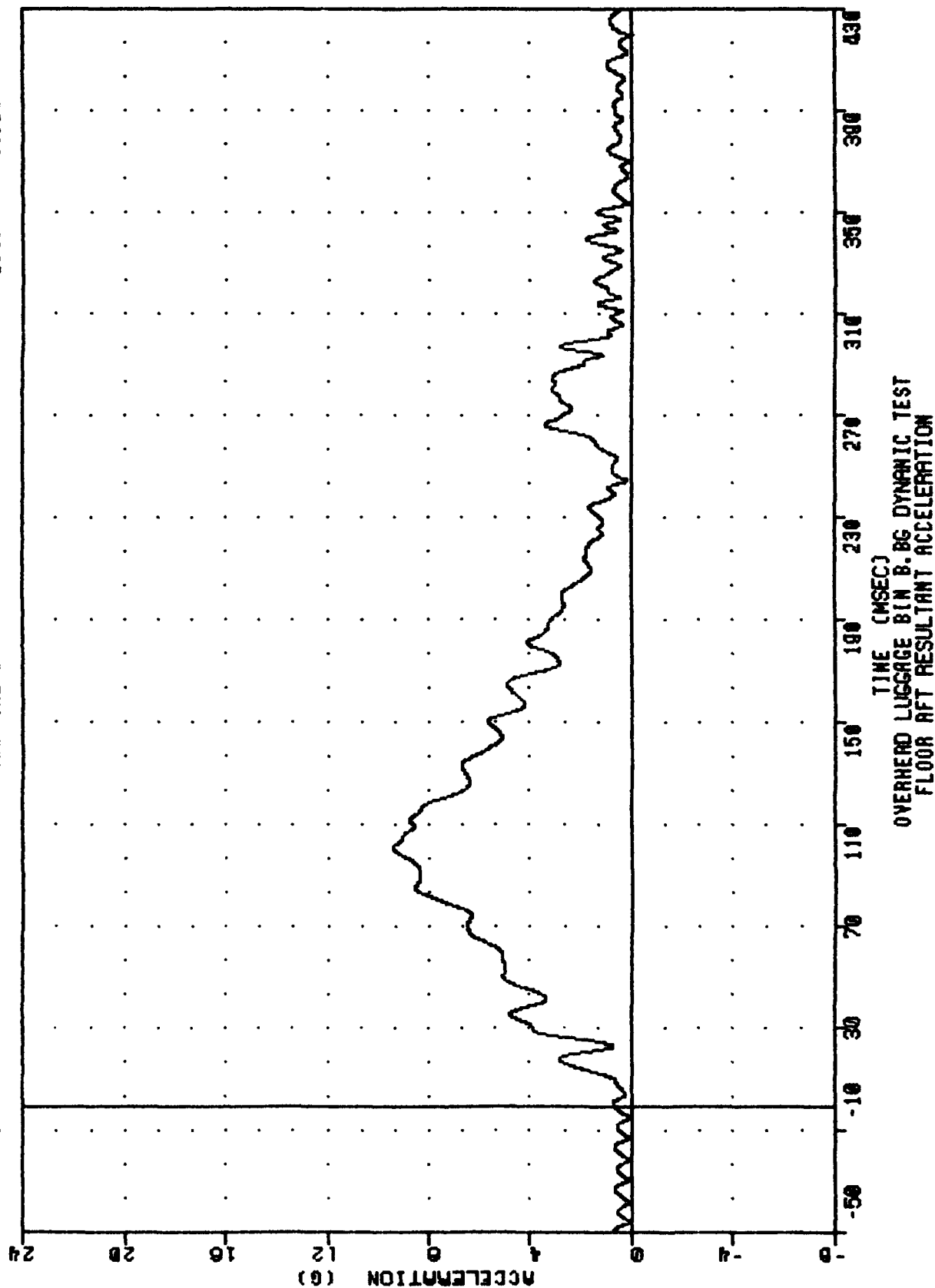
FILTER - 8LPE 100/ 316/ -40

MIN. MAX VALUES = -2.52 297.38, 1.79 263.38

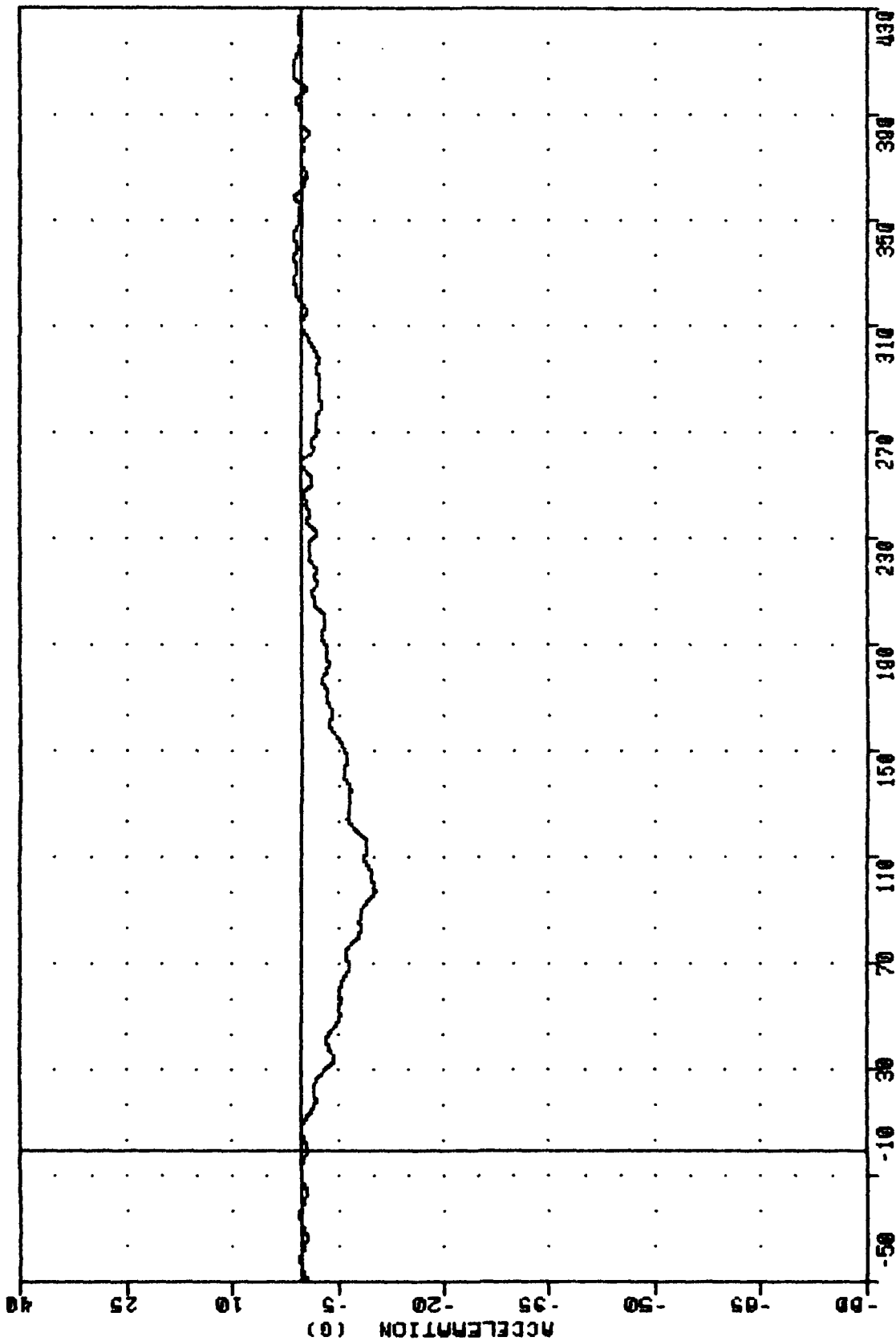


TIME (MSEC)
OVERHEAD LUGGAGE BIN 8.0G DYNAMIC TEST
FLOOR AFT VERTICAL ACCELERATION

FRR
 91024
 FLARG
 . TEST 002
 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : 0.03e -21.25, 9.43 e 100.00

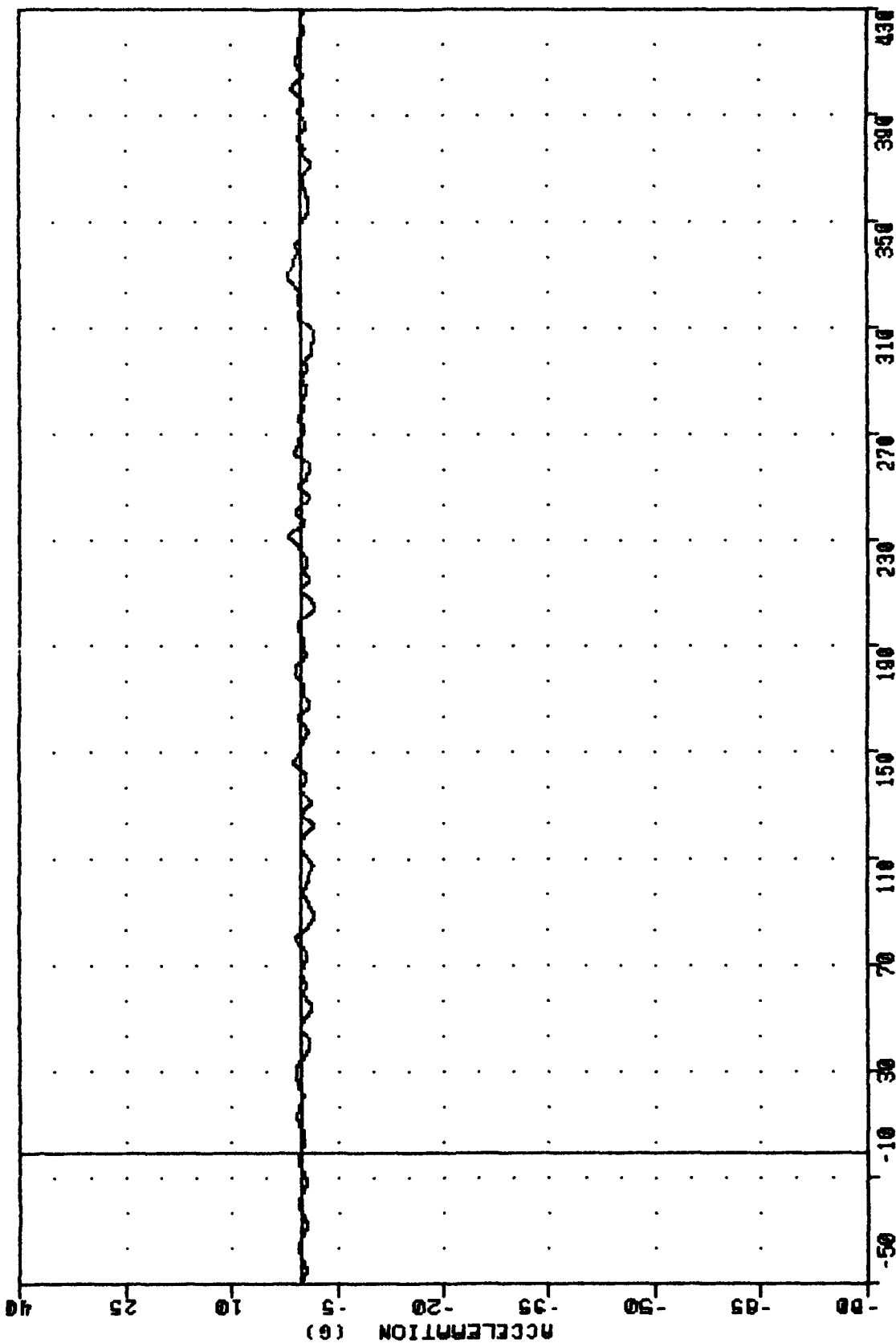


FRA
 91024
 FNTX6
 . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 FILTER = 8LPF 100/ 316/ -40
 MIN, MAX VALUES : -10.30g 97.25, 1.26 g 327.75



TIME (MSEC)
 OVERHEAD LUGGAGE BIN 8.8G DYNAMIC TEST
 FUSELAGE MID TOP LONGITUDINAL ACCELERATION

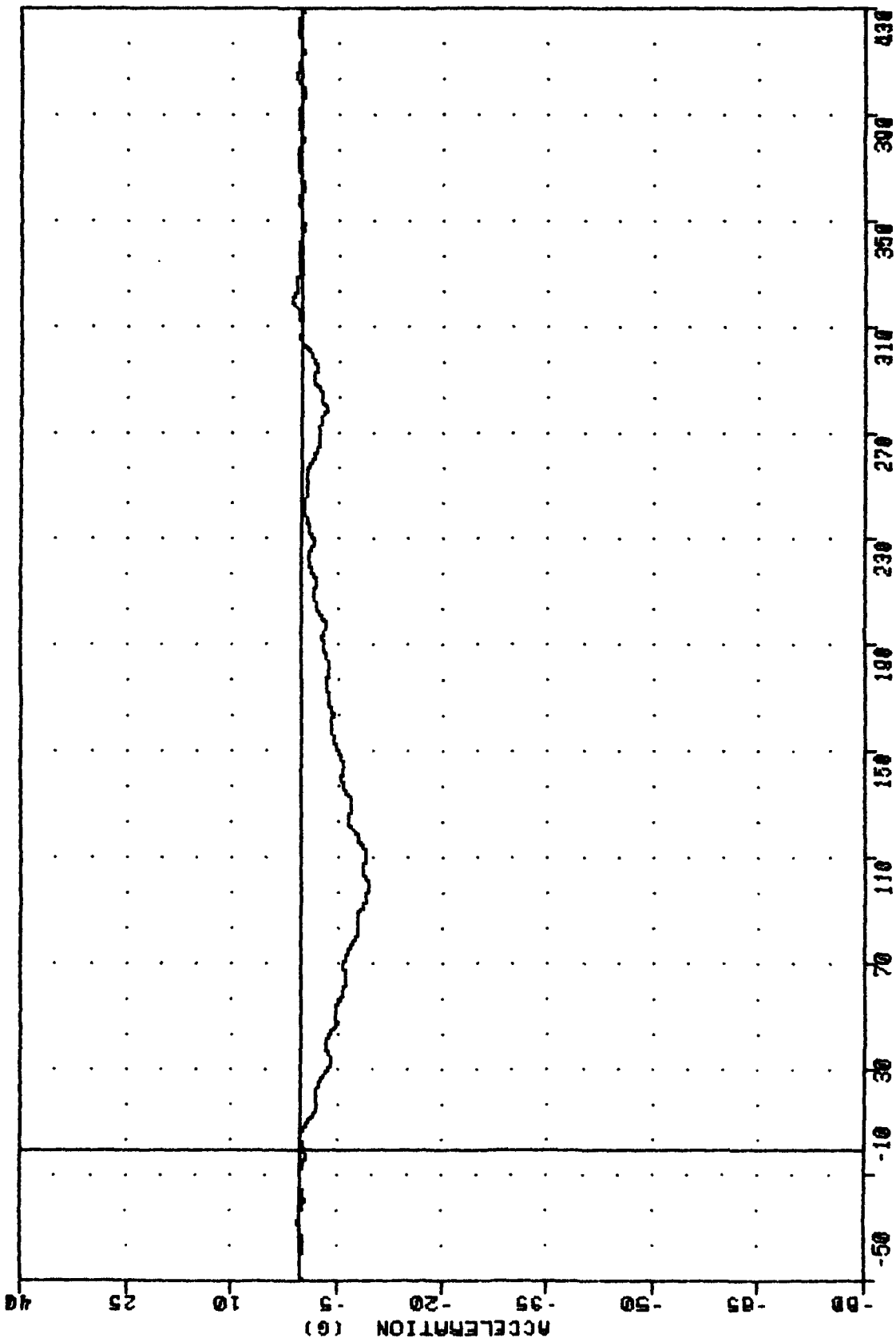
FRR
 91024
 PNT26
 . TEST 002
 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -1.77e 308.88, 1.98 e 330.15



TIME (MSEC)
 OVERHEAD LUGGAGE BIN B.BG DYNAMIC TEST
 FUSELAGE MID TOP VERTICAL ACCELERATION

FRR
 91024
 FN3X6

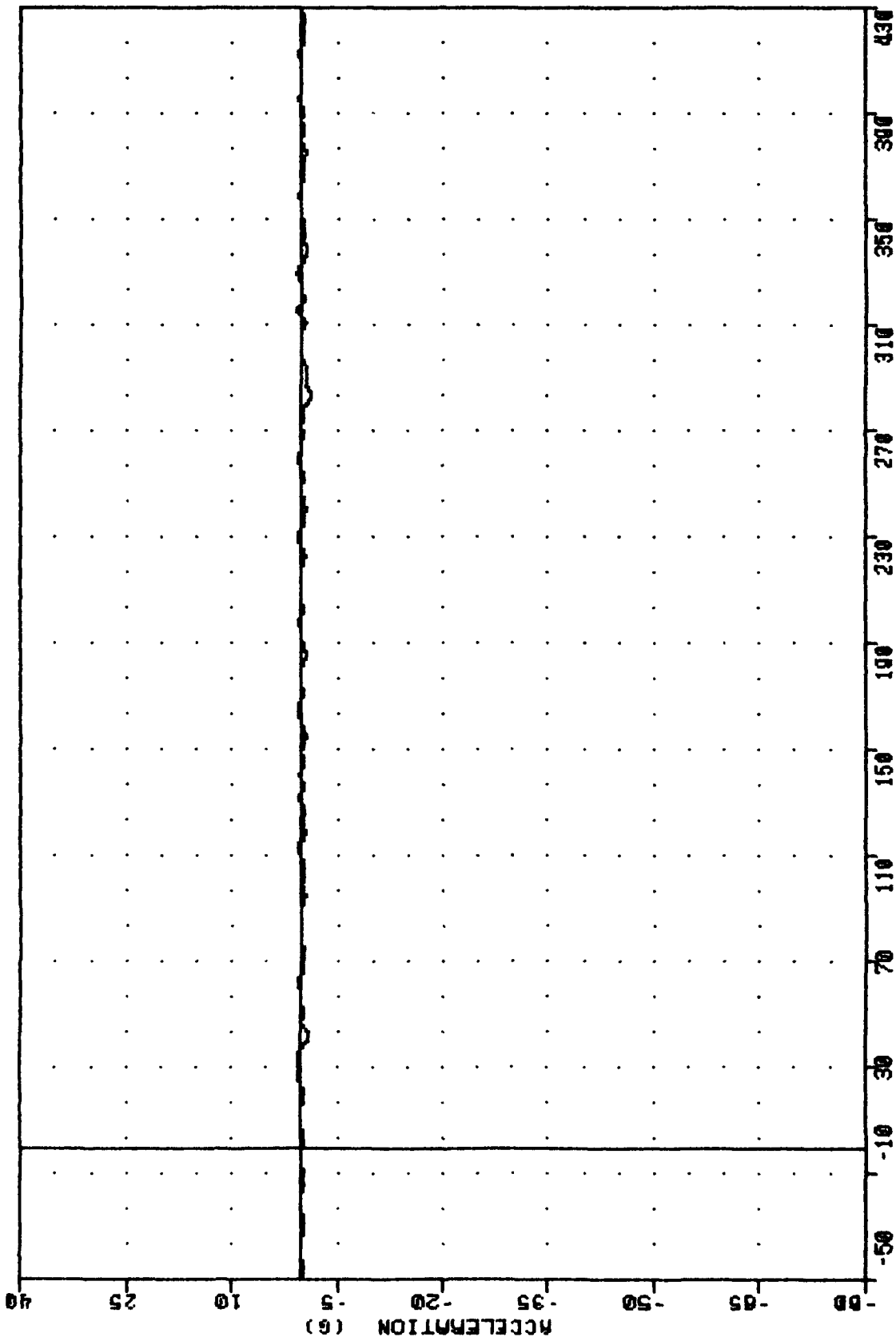
. TEST 002 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -9.40 98.88 1.04 320.00



OVERHEAD LUGGAGE BIN B.BG DYNAMIC TEST
 FUSELAGE MID STARBOARD LONGITUDINAL ACCELERATION

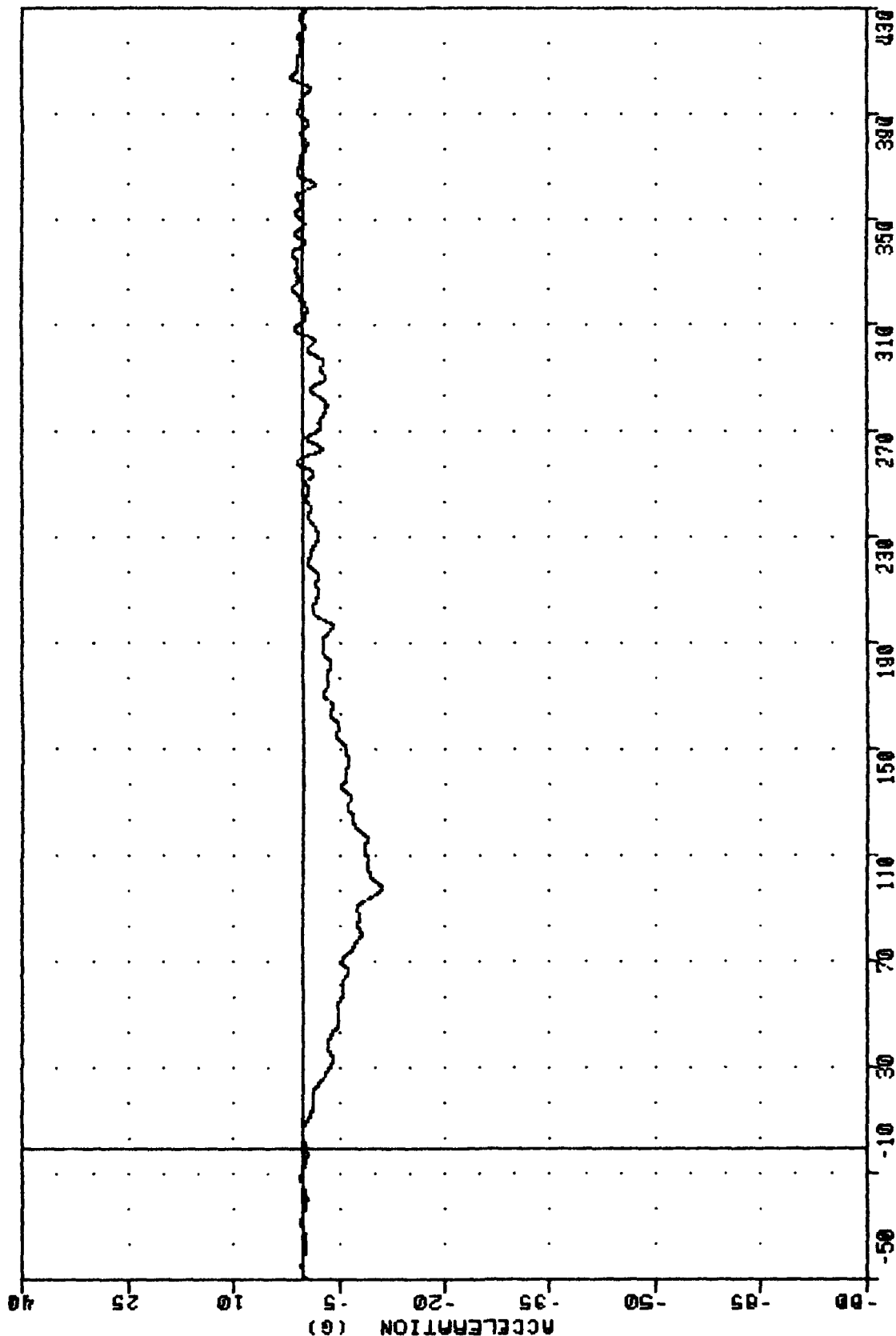
FAA
 91024
 FN326

. TEST 002 . OVERHEAD LUGGAGE BIN TEST
 FILTER - 8L PF 100/ 316/ -40
 MIN. MAX VALUES : -1.33e 263.25, 0.74 e 315.63



TIME (MSEC)
 OVERHEAD LUGGAGE BIN B.BG DYNAMIC TEST
 FUSELAGE MID STARBOARD VERTICAL ACCELERATION

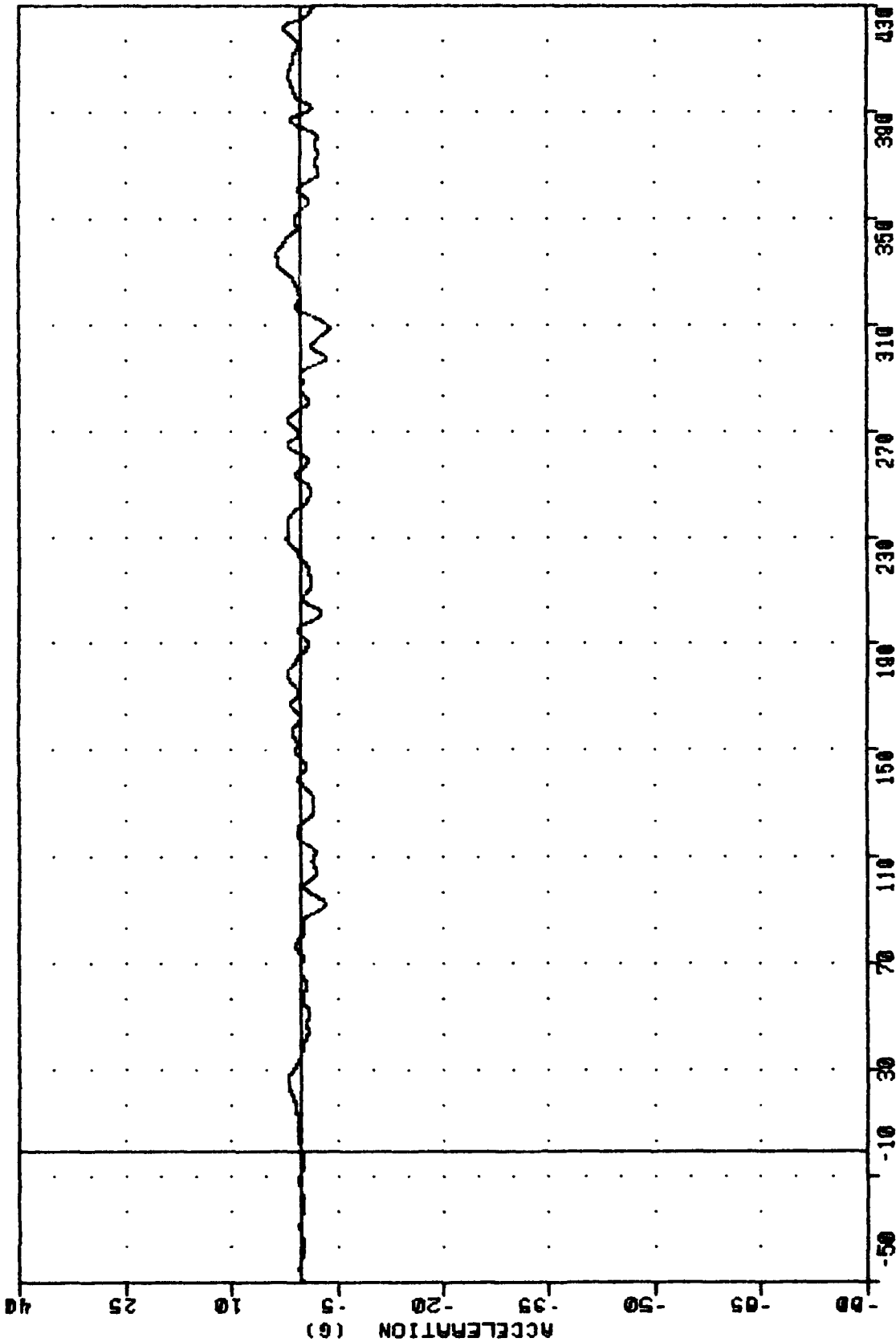
FRR
 91024
 FATX6
 . TEST 002
 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -11.12 97.75, 1.00 e 404.00



TIME (MSEC)
 OVERHEAD LUGGAGE BIN B.BG DYNAMIC TEST
 FUSELAGE AFT TOP LONGITUDINAL ACCELERATION

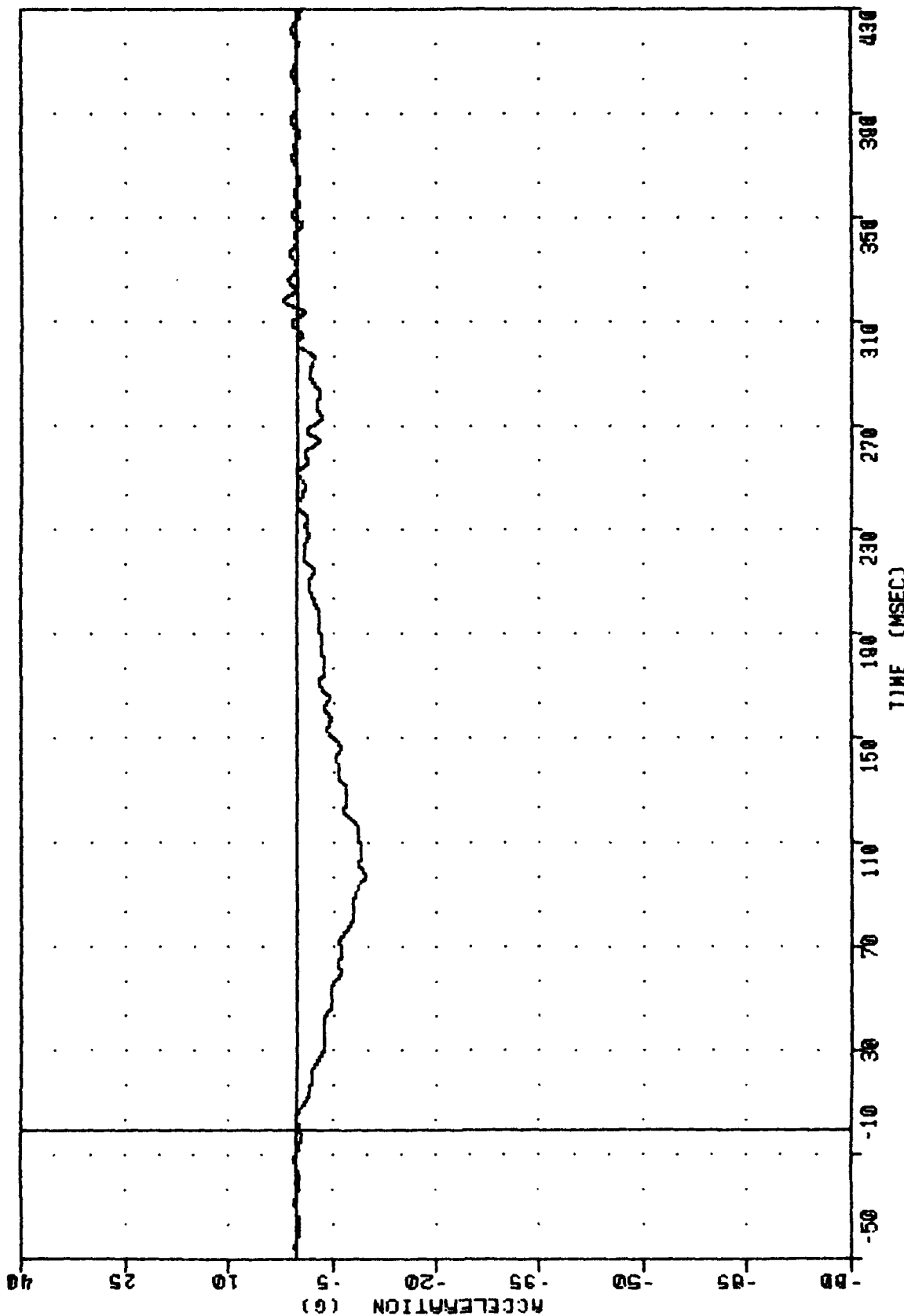
FAR
 91024
 PATZ6

. TEST 002 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -3.95e 309.25, 3.57 e 337.23



TIME (MSEC)
 OVERHEAD LUGGAGE BIN B. BG DYNAMIC TEST
 FUSELAGE AFT TOP VERTICAL ACCELERATION

FRR
 91024
 FASX6
 . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -9.84e 97.50. 2.23 e 318.25



OVERHEAD LUGGAGE BIN B.BG DYNAMIC TEST
 FUSELAGE AFT STARBOARD LONGITUDINAL ACCELERATION

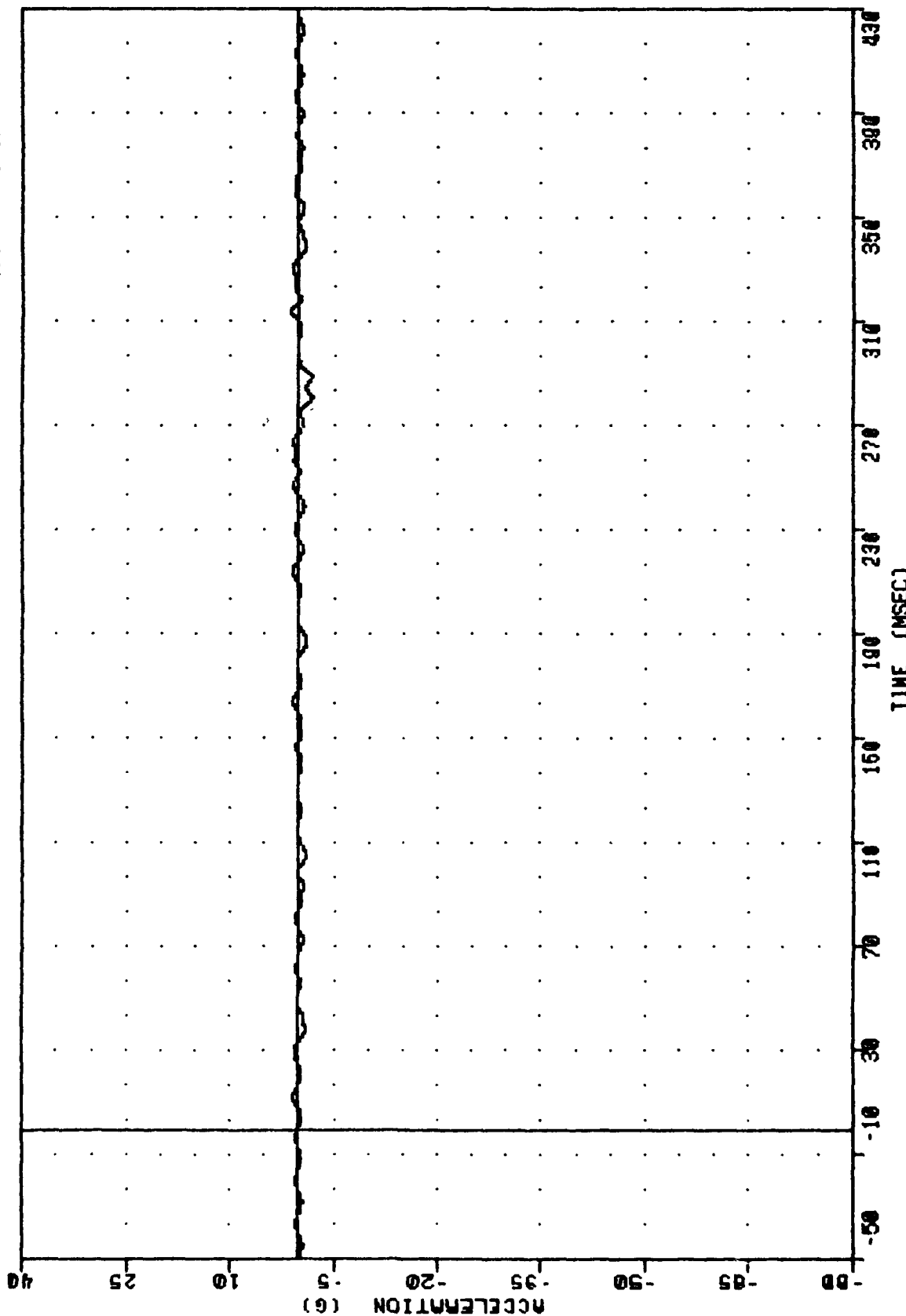
FAA
91024
FA326

TEST 002

OVERHEAD LUGGAGE BIN TEST

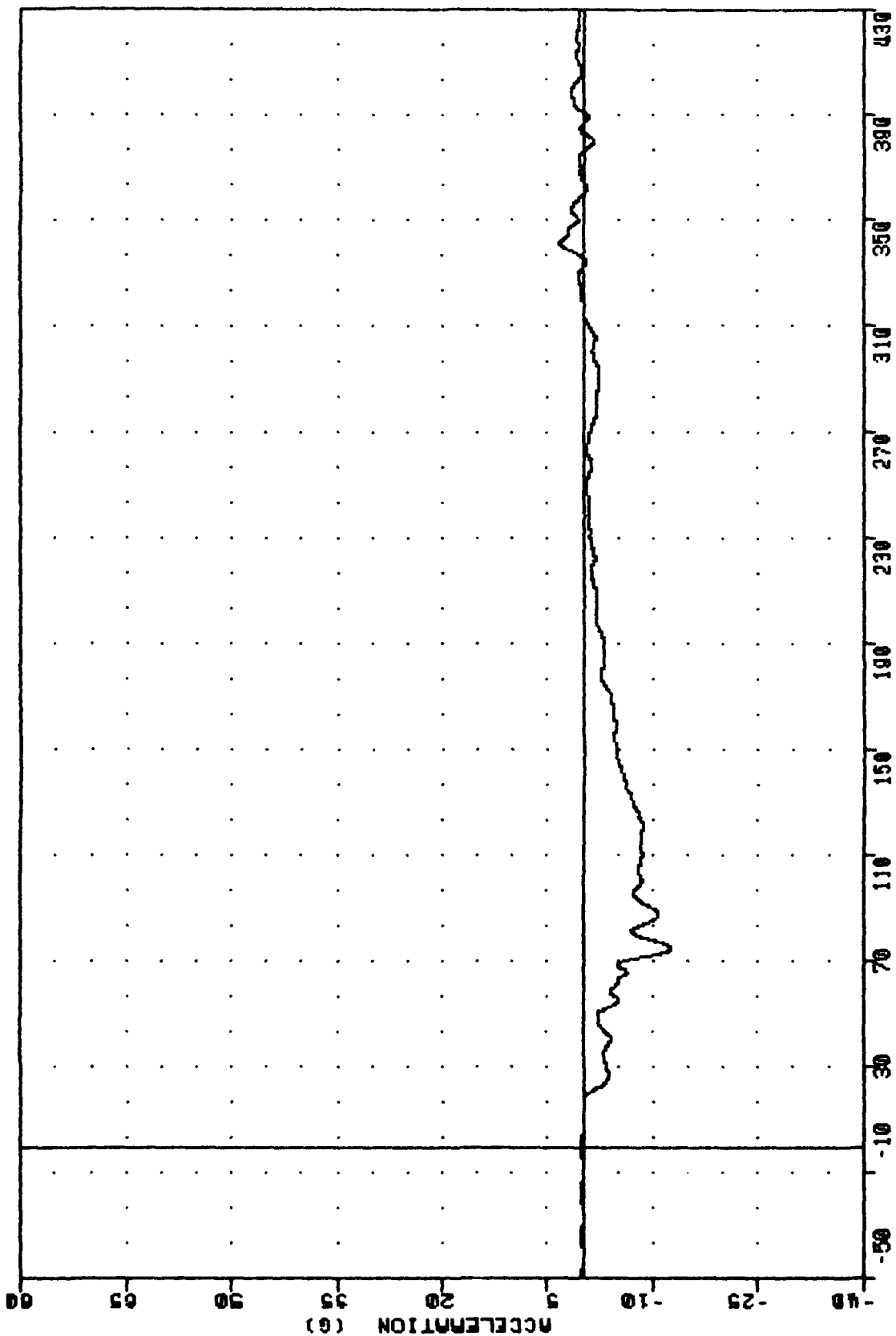
FILTER - 8LPF 100/ 316/ -40

MIN. MAX VALUES : -1.64g 280.36g 1.27g 313.75



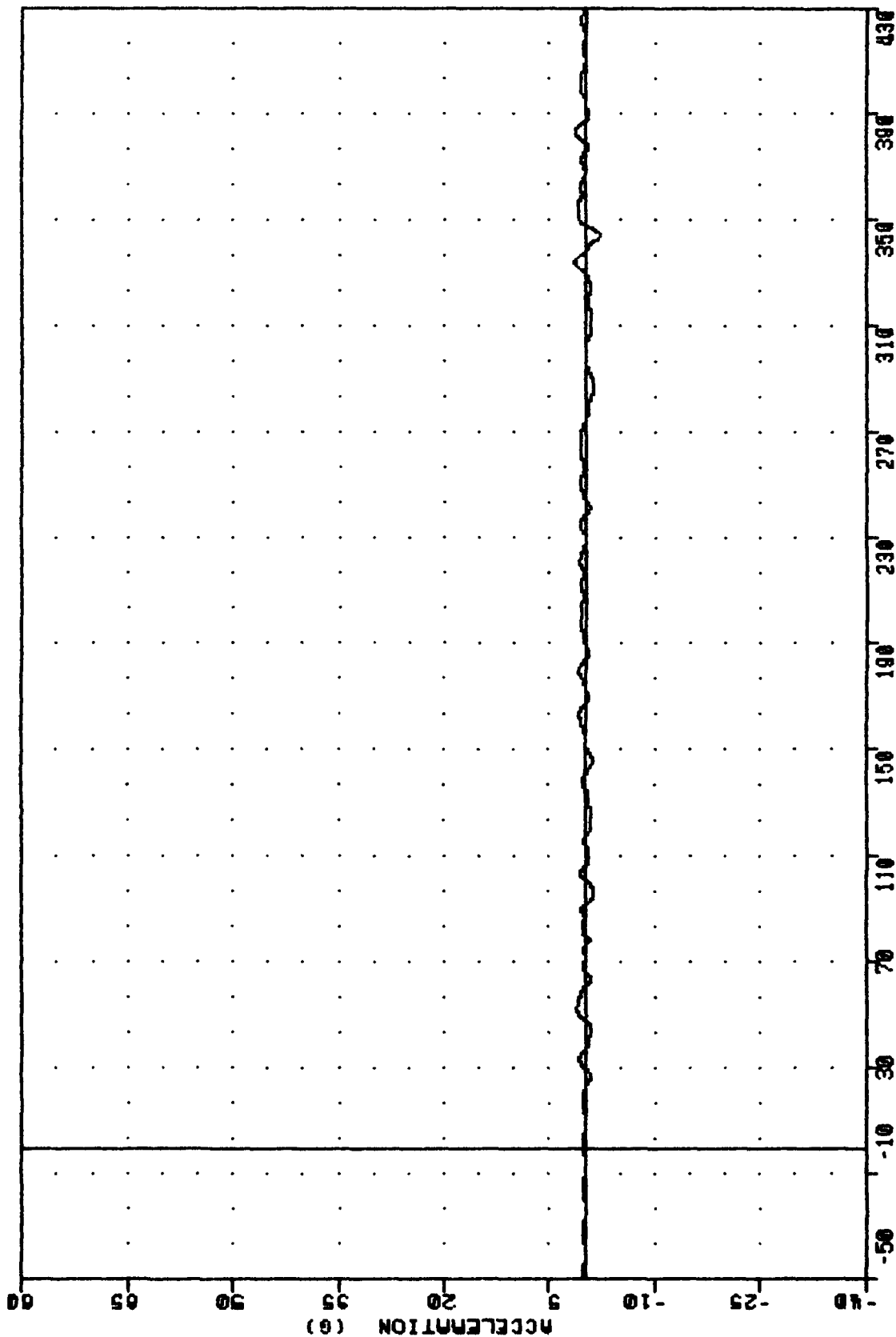
OVERHEAD LUGGAGE BIN B.B.G DYNAMIC TEST
FUSELAGE AFT STARBOARD VERTICAL ACCELERATION

FAR 91024 00X6
 . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 FILTER - 8LPF 100/ 316/ -40
 MIN. MAX VALUES : -12.67g 75.00g 3.23g 341.00



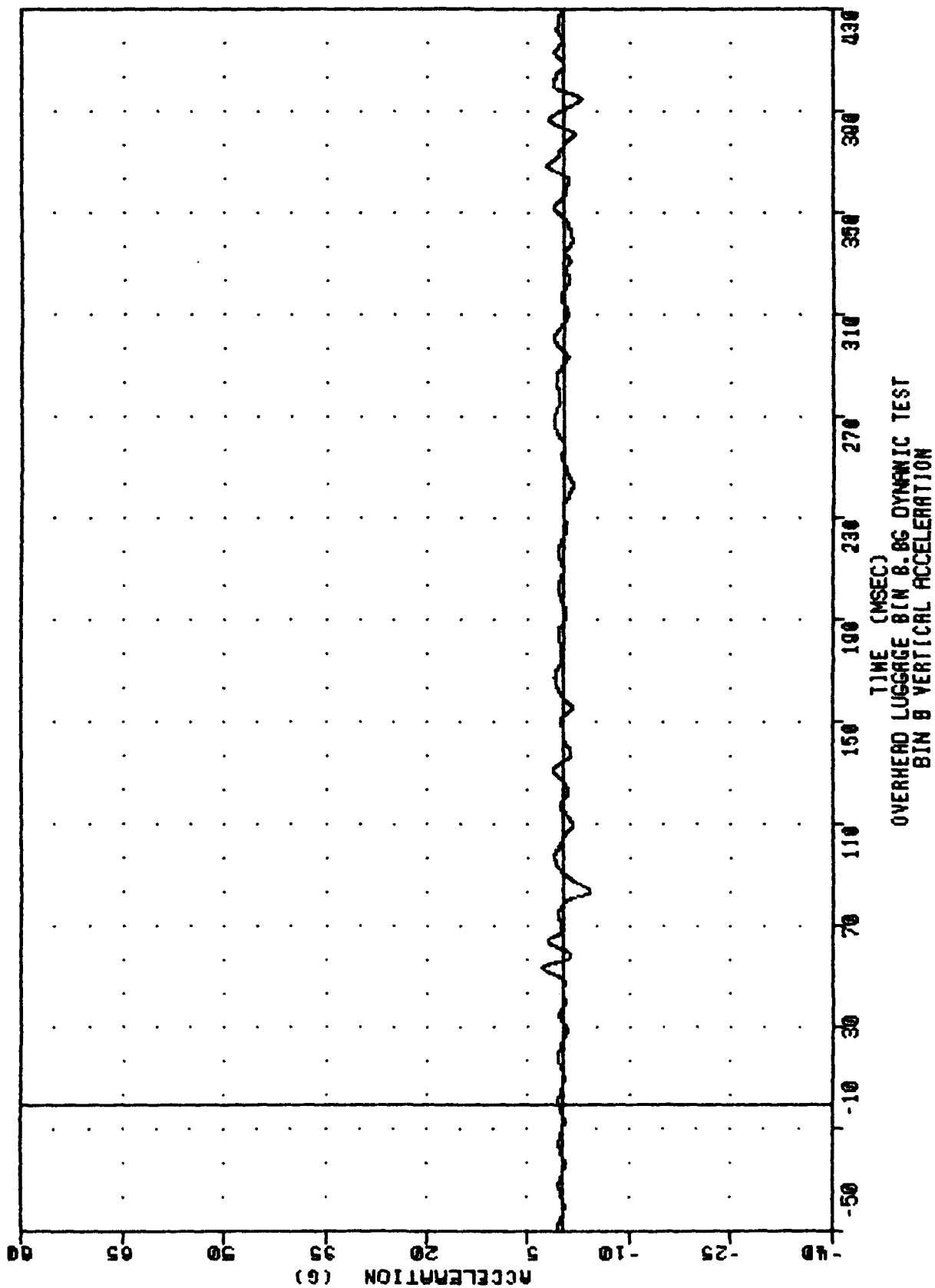
OVERHEAD LUGGAGE BIN 8.8G DYNAMIC TEST
 BIN B LONGITUDINAL ACCELERATION

FAR 91024 08Y6
 . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 FILTER - 8LPF 100/ 316/ -40
 MIN. MAX VALUES : -2.23 344.38 . 1.45 334.15



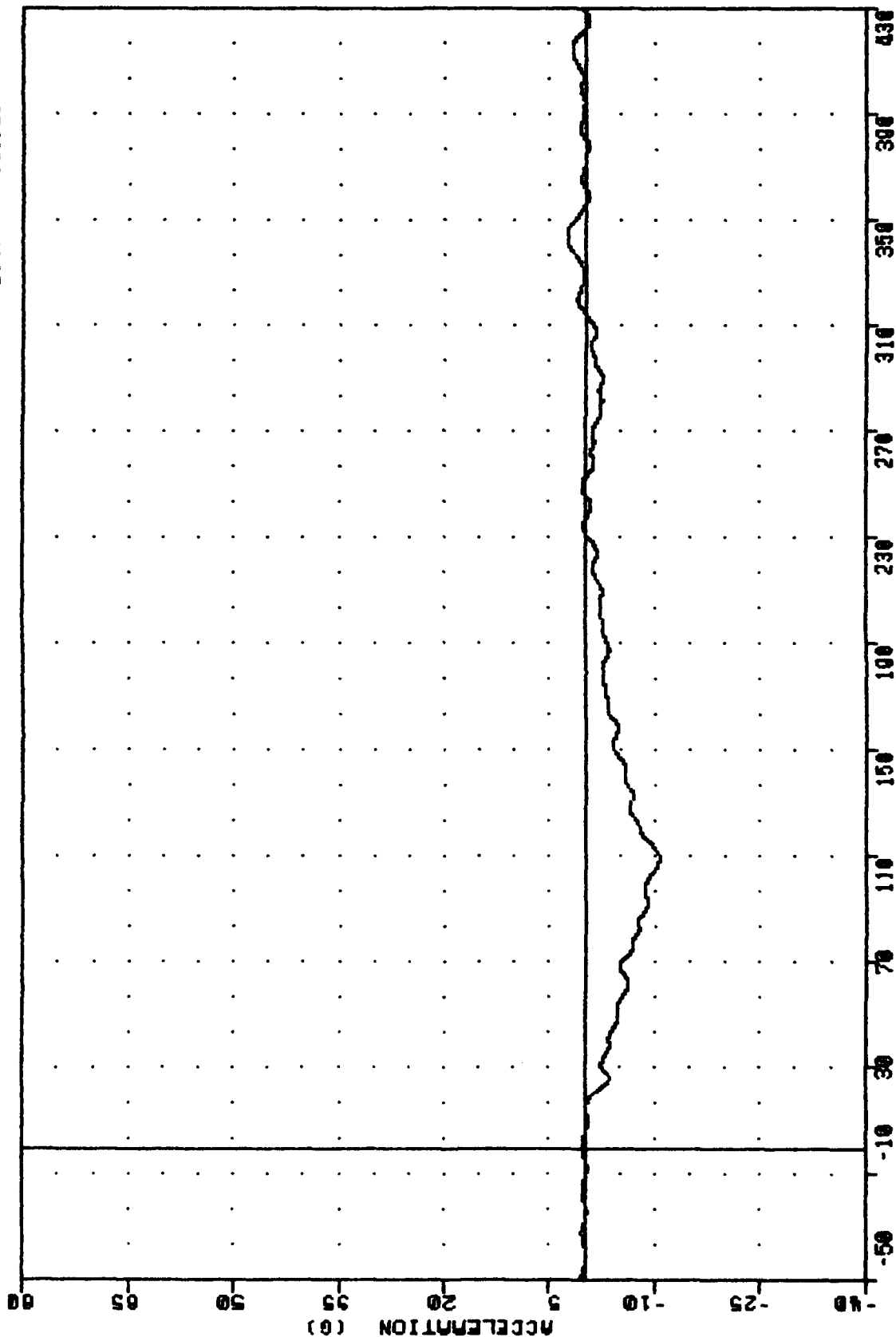
TIME (MSEC)
 OVERHEAD LUGGAGE BIN 8.8G DYNAMIC TEST
 BIN 8 LATERAL ACCELERATION

FAR
 91024
 0026
 . TEST 002
 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -4.216 83.66 2.66 53.75



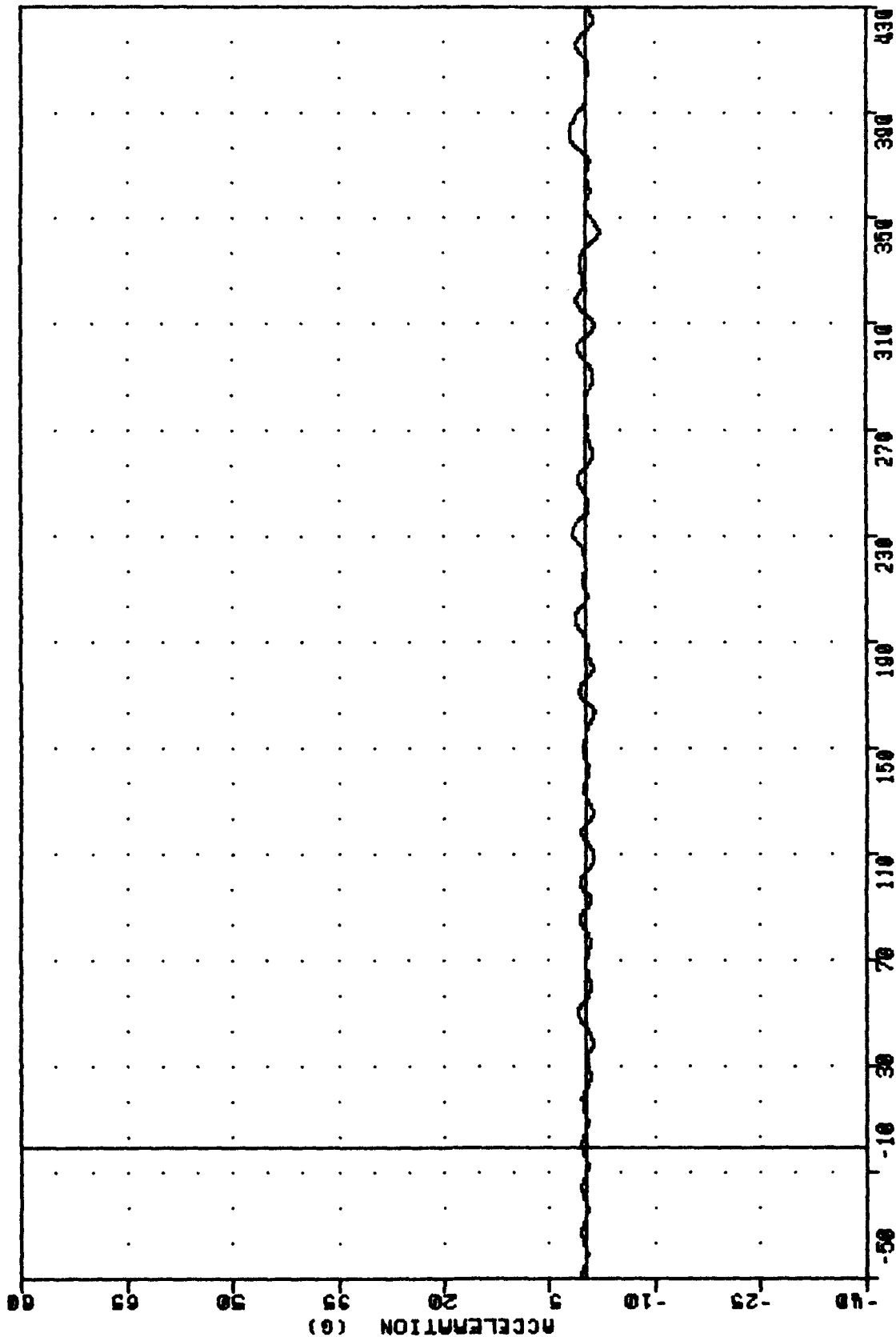
TIME (MSEC)
 OVERHEAD LUGGAGE BIN B.BG DYNAMIC TEST
 BIN B VERTICAL ACCELERATION

FRA 91024
 NOX6
 TEST 002
 OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES = -10.60 109.50, 2.47 345.25



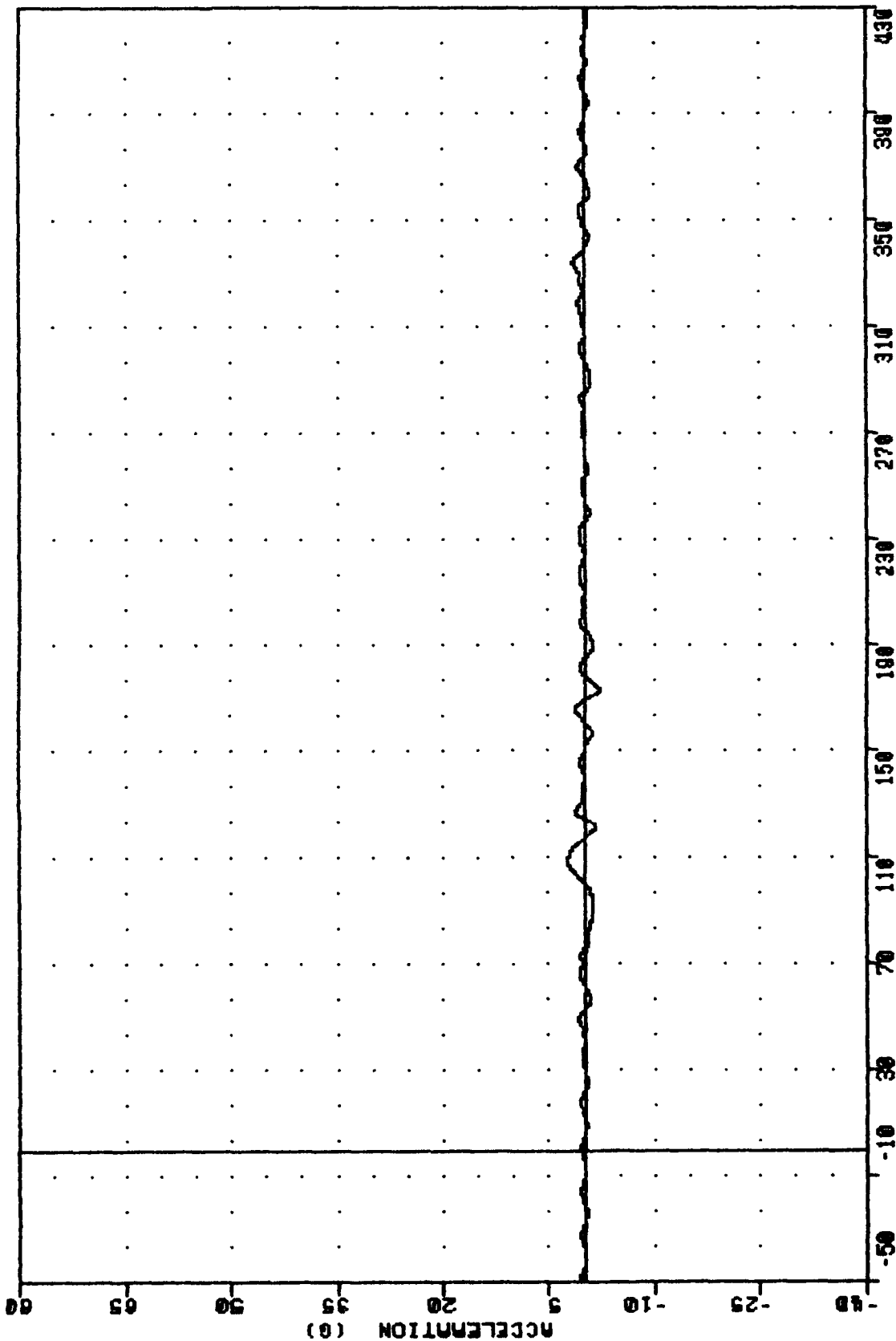
OVERHEAD LUGGAGE BIN B.BG DYNAMIC TEST
 BIN A LONGITUDINAL ACCELERATION

FRA 91024 . TEST 002 . OVERHEAD LUGGAGE BIN TEST
 H0Y6 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -2.20 344.63, 2.09 382.50



OVERHEAD LUGGAGE BIN 8.0G DYNAMIC TEST
 BIN A LATERAL ACCELERATION

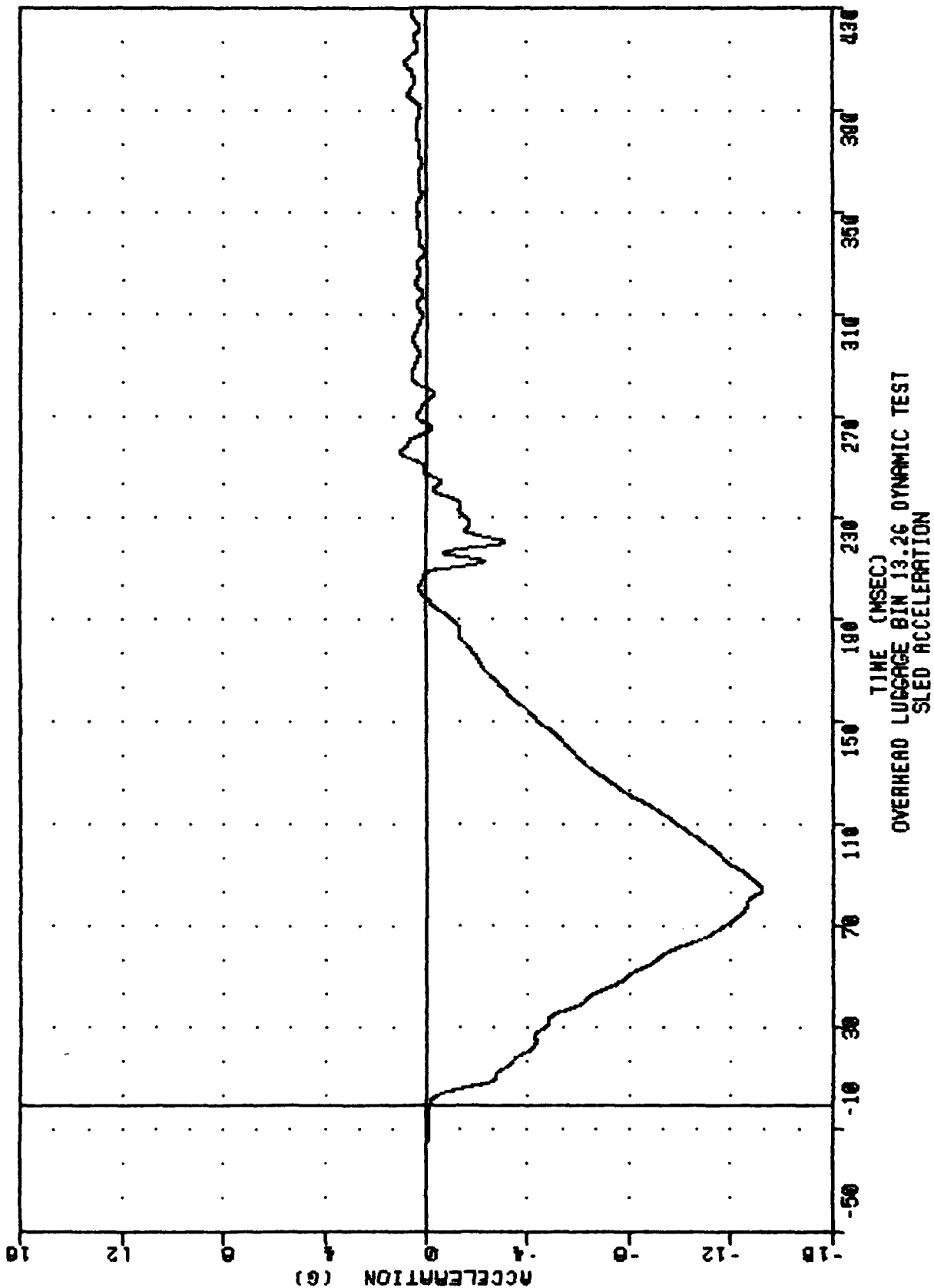
FRA 91024 HB26
 . TEST 0002 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -2.15e 173.13e 2.24 e 100.58



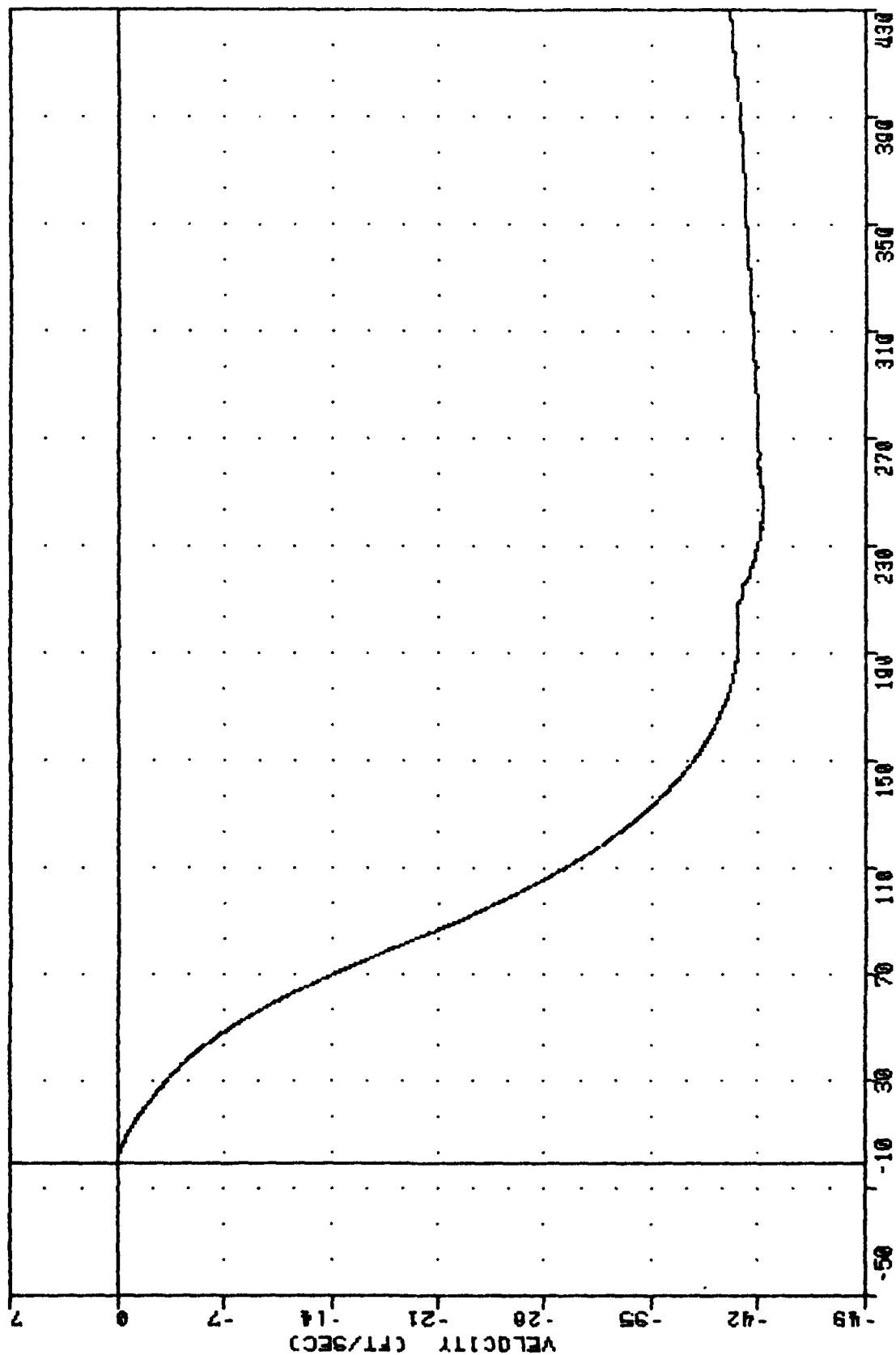
TIME (MSEC)
 OVERHEAD LUGGAGE BIN B.BG DYNAMIC TEST
 BIN A VERTICAL ACCELERATION

TEST 003

FAR 91025 3LOX6 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -13.18g 84.73, 1.01 g 236.00

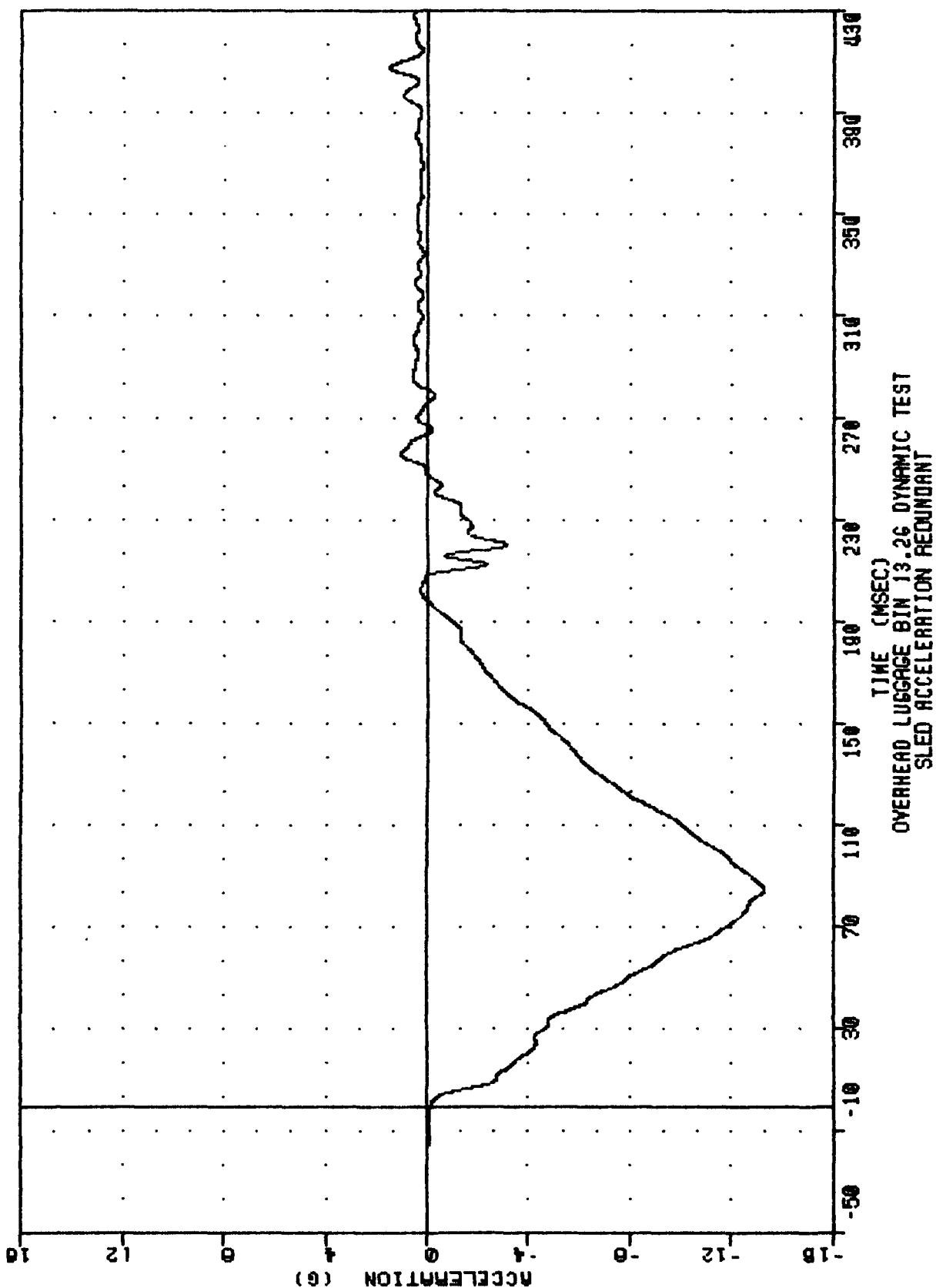


FRA . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 91025 FILTER - BLPF 300/ 949/ -40
 3LDXYI MIN. MAX VALUES = -42.90e 243.38, 0.00 e -36.58

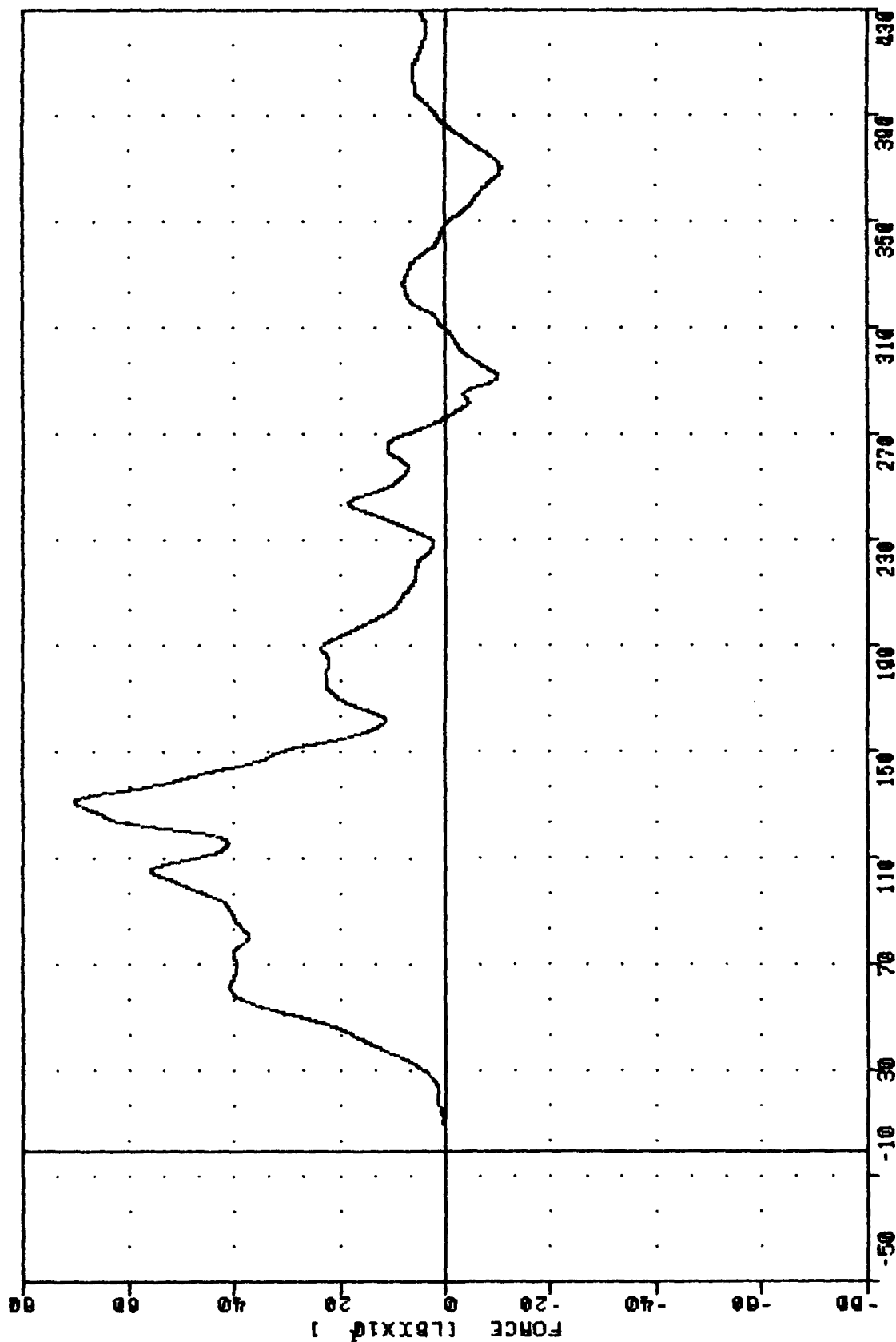


OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 SLED VELOCITY INTEGRATED

FAR 91025 310X6A
 TEST 003
 OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -13.34g 84.73, 1.48 g 407.73

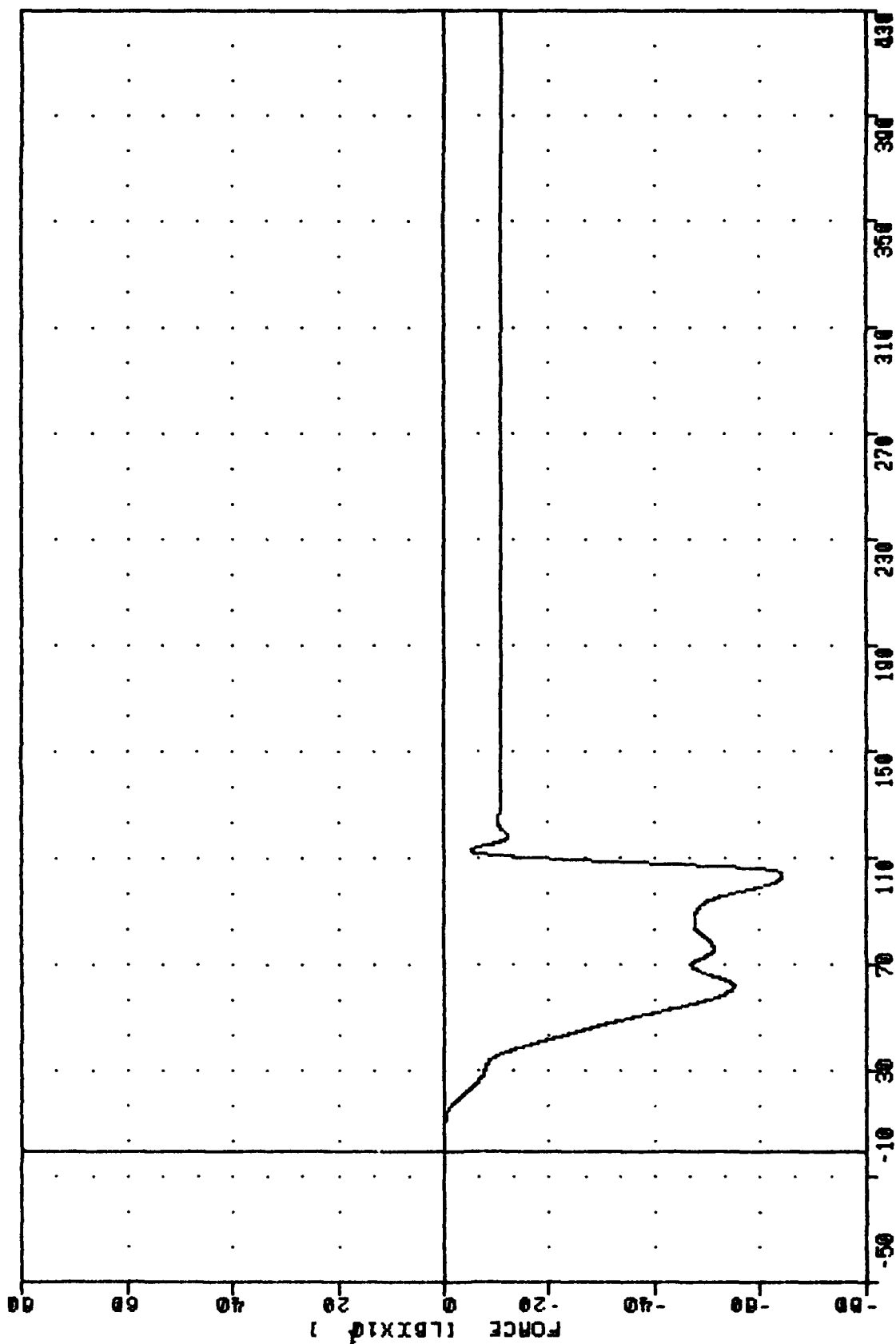


FRA 91025 1703 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -106.46 370.23, 702.47 131.23



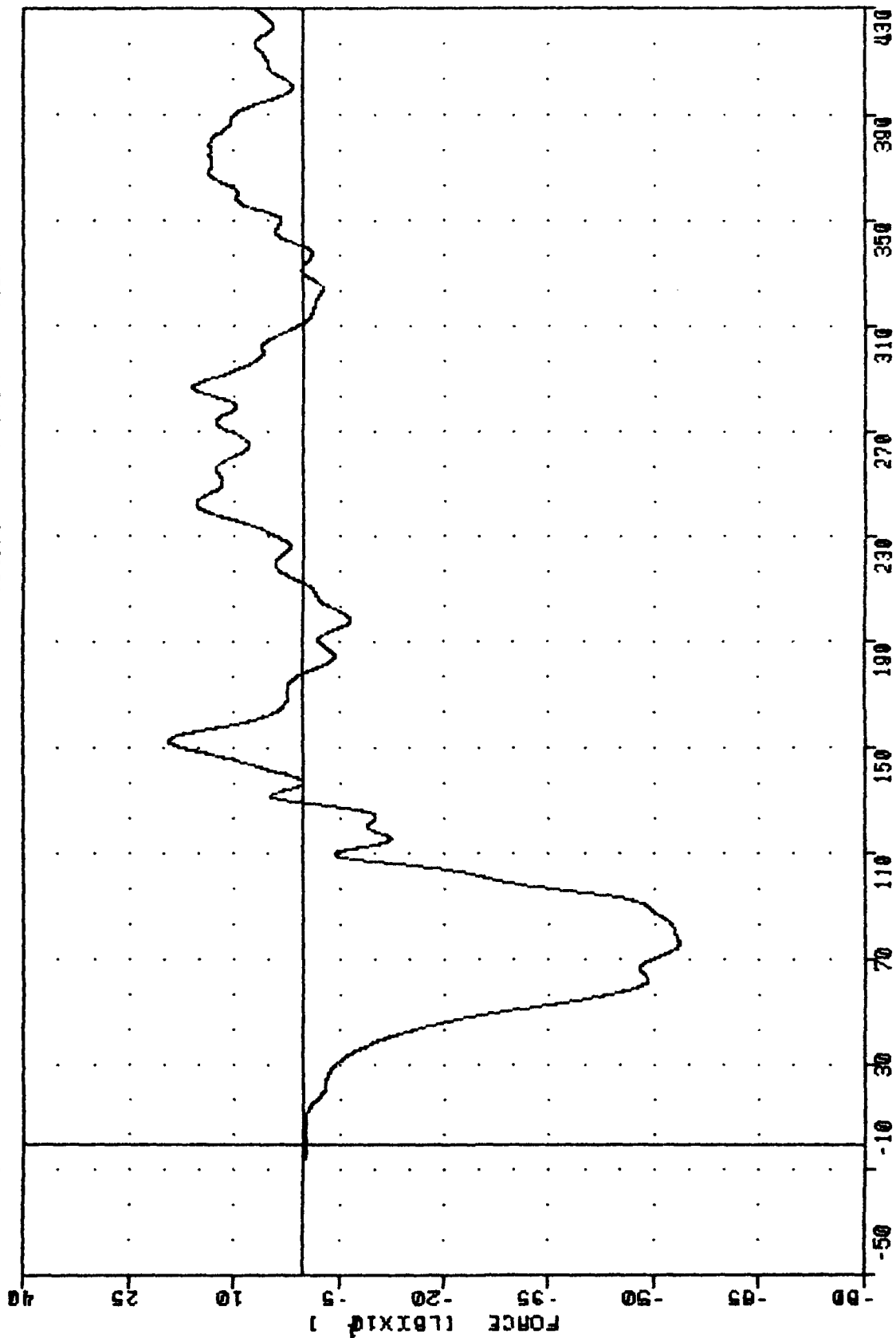
TIME (MSEC)
 OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 BIN B TURBUCKLE 78 FORCE

FAR . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 91025 FILTER - BLPF 100/ 316/ -40
 T063 MIN. MAX VALUES = -642.93 103.63 0.63 15.75



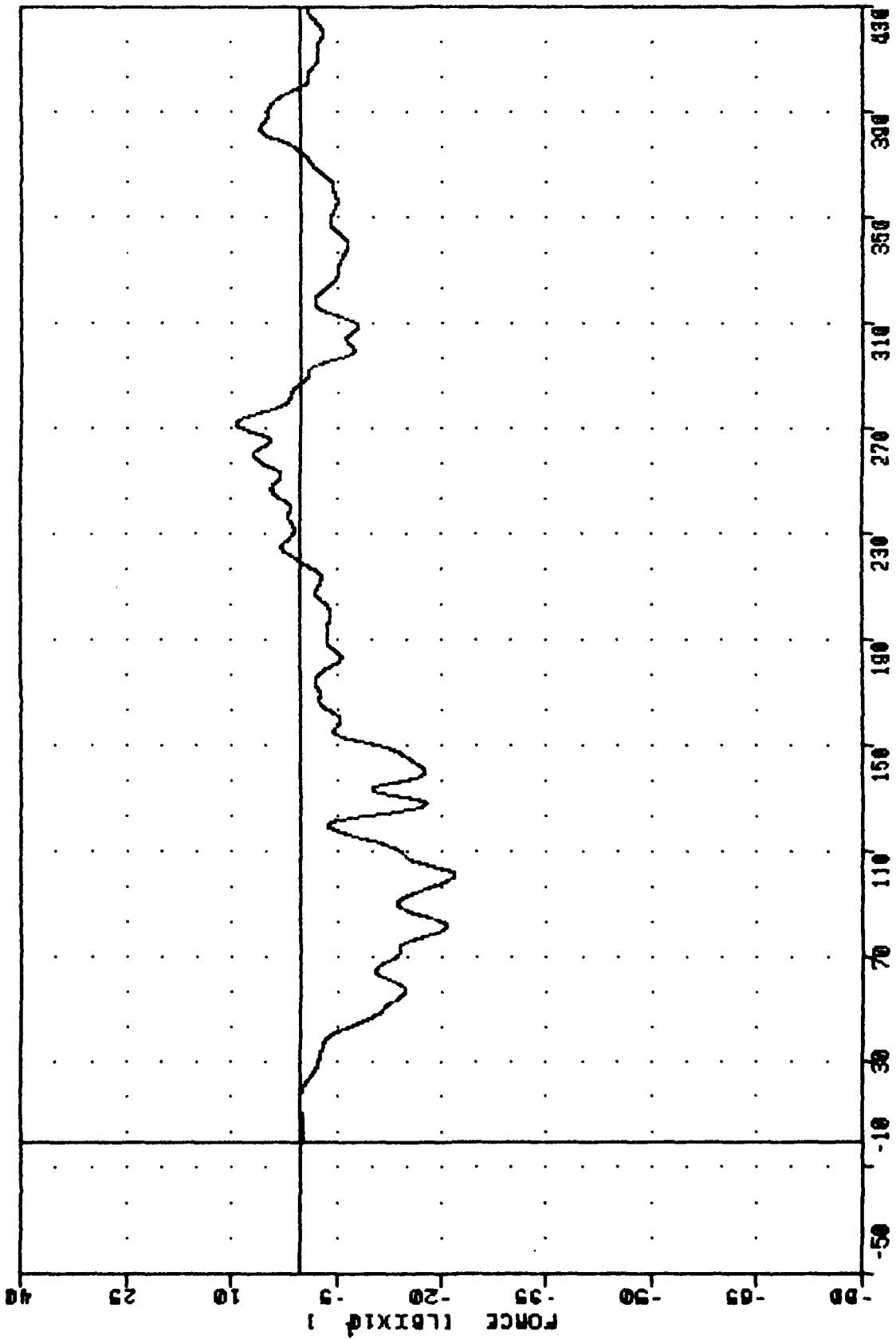
OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 BIN B TURNBUCKLE 88 FORCE

FRA . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 91025 FILTER - BLPF 100/ 316/ -40
 11763 MIN. MAX VALUES = -554.78 76.38 . 192.31 152.66



OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 BIN B TURNBUCKLE 178 FORCE

FRA 91025 71003 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FILTER - 9LPF 100 / 316 / -40
 MIN. MAX VALUES : -218.91 101.13 93.91 271.73



OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 BIN B TURNBUCKLE 188 FORCE

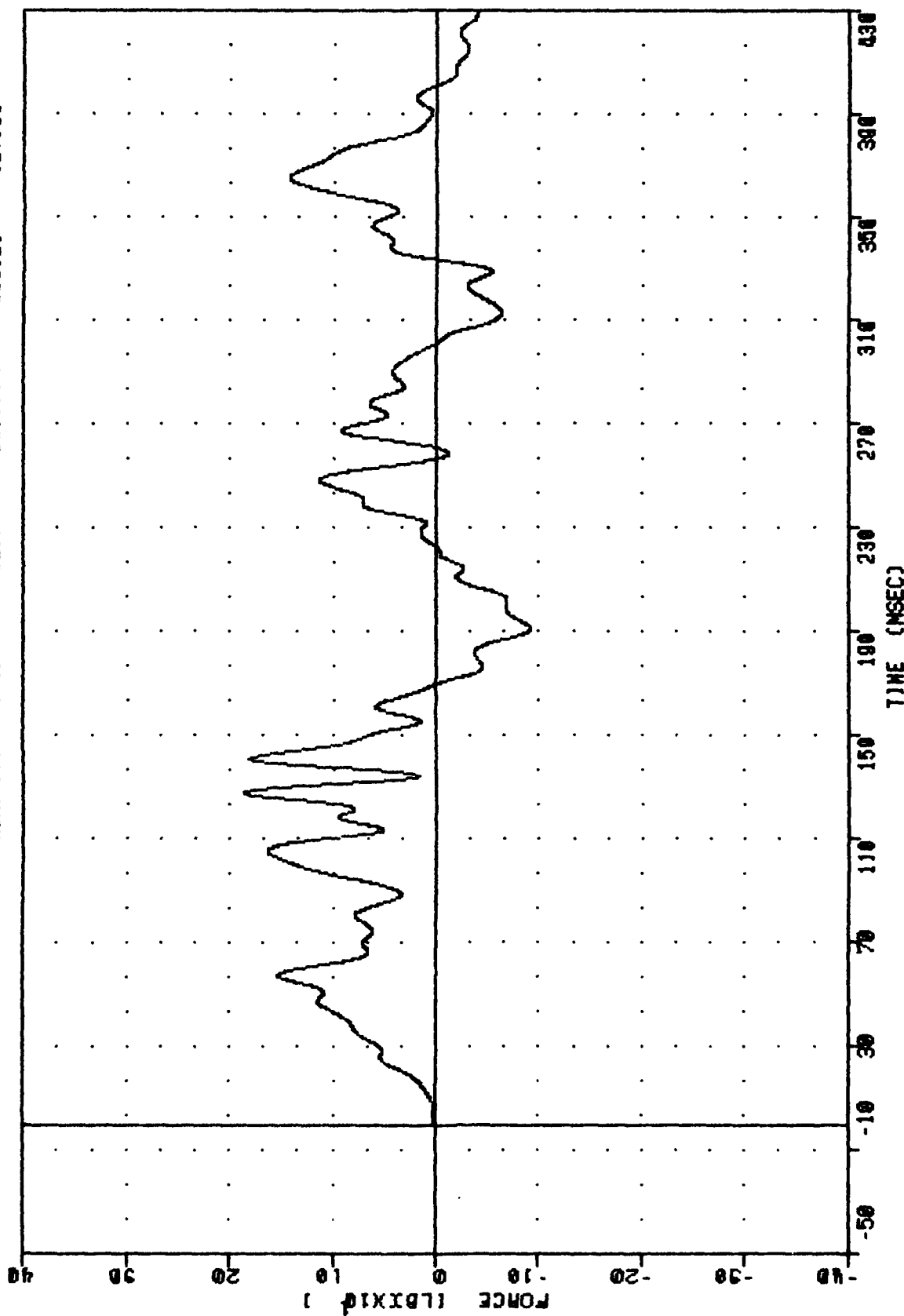
FAR
91025
T2003

. TEST 003

. OVERHEAD LUGGAGE BIN TEST

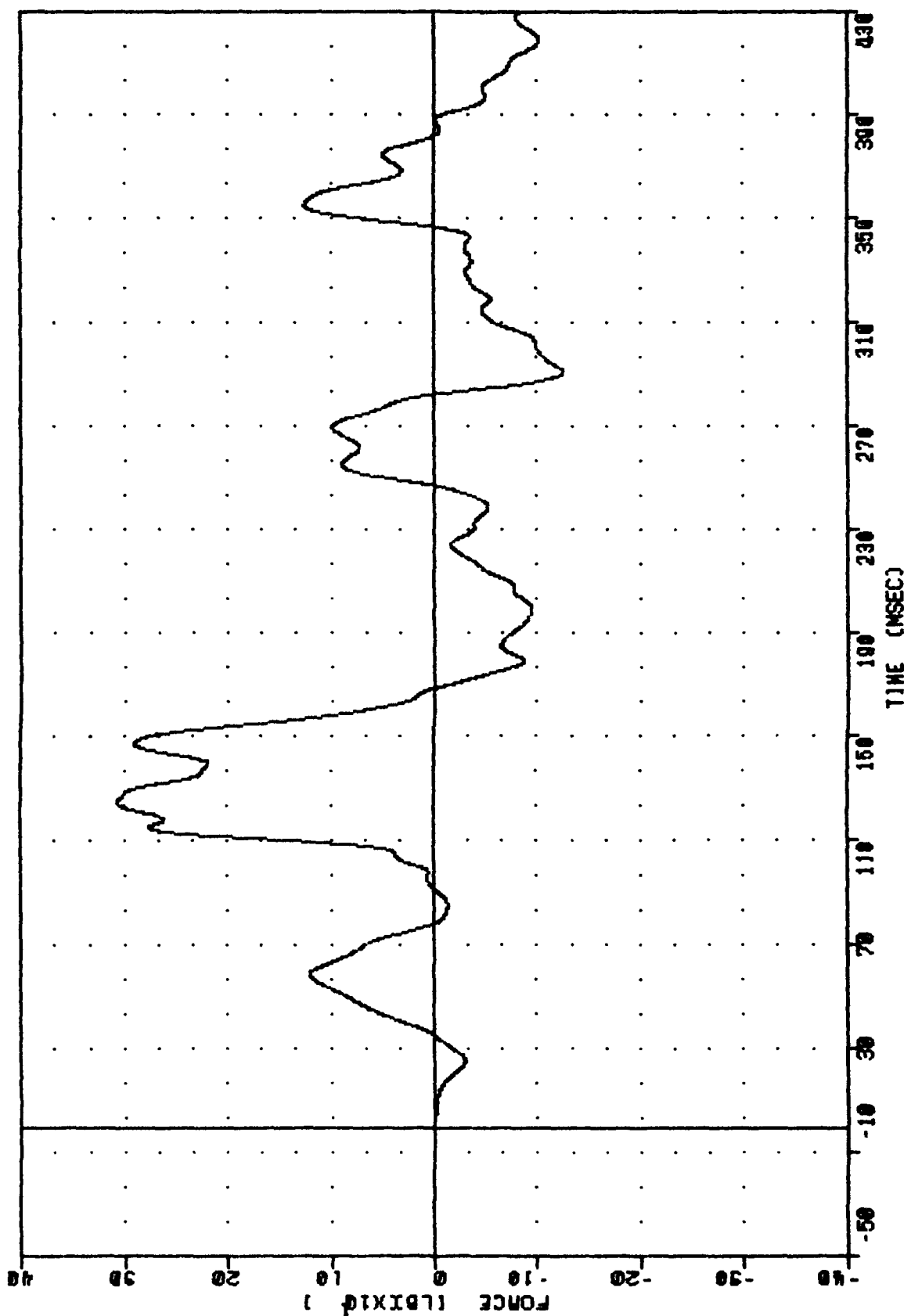
FILTER - BLPF 100/ 316/ -40

MIN. MAX VALUES : -92.77e 191.13, 180.28 e 127.86



OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
BIN 8 TURNBUCKLE 288 FORCE

FRA . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 91025 FILTER = 8LPE 100/ 316/ -40
 12383 MIN. MAX VALUES : -125.28 290.88 . 506.06 124.88



OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 BIN B TURNBUCKLE 258 FORCE

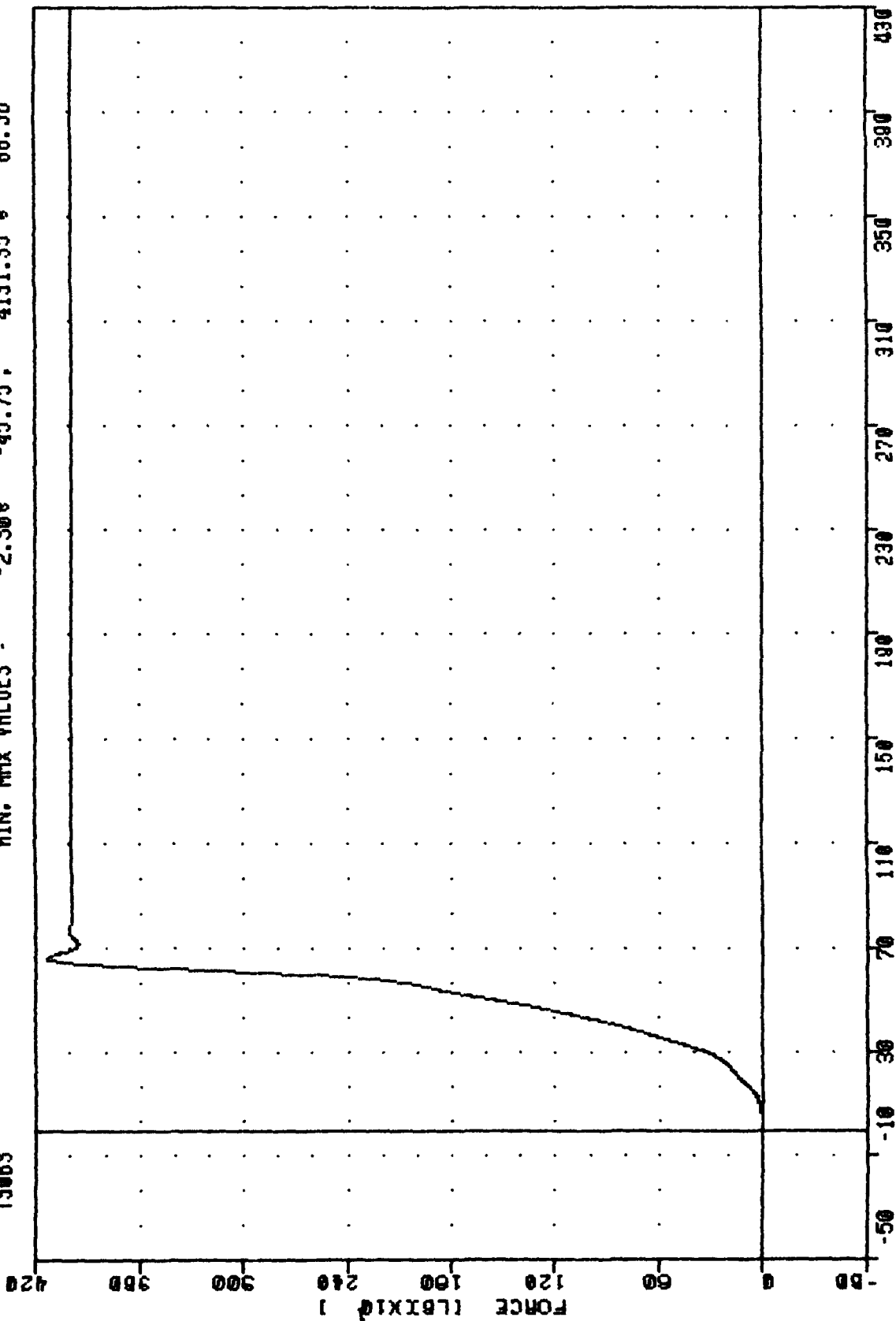
FAR
91025
13083

TEST 003

OVERHEAD LUGGAGE BIN TEST

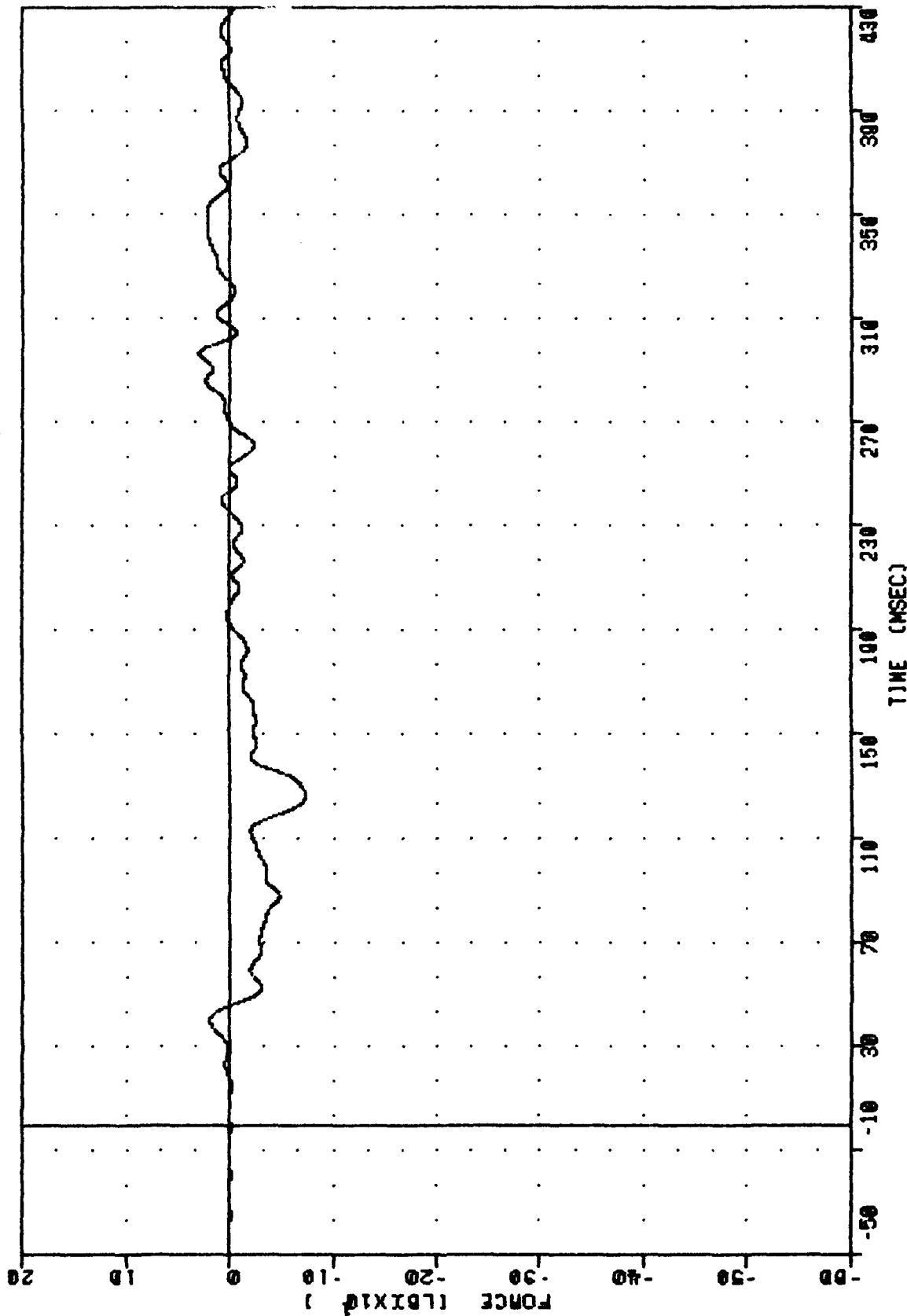
FILTER - BLPF 100/ 316/ -40

MIN. MAX VALUES : -2.30e -45.75, 4151.35 e 66.50



TIME (MSEC)
OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
BIN 8 TURNBUCKLE 308 FORCE

FAR 91025
 TEST 003
 OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -72.61e 127.13, 29.84 e 296.85



OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 BIN A TURNBUCKLE 3H FORCE

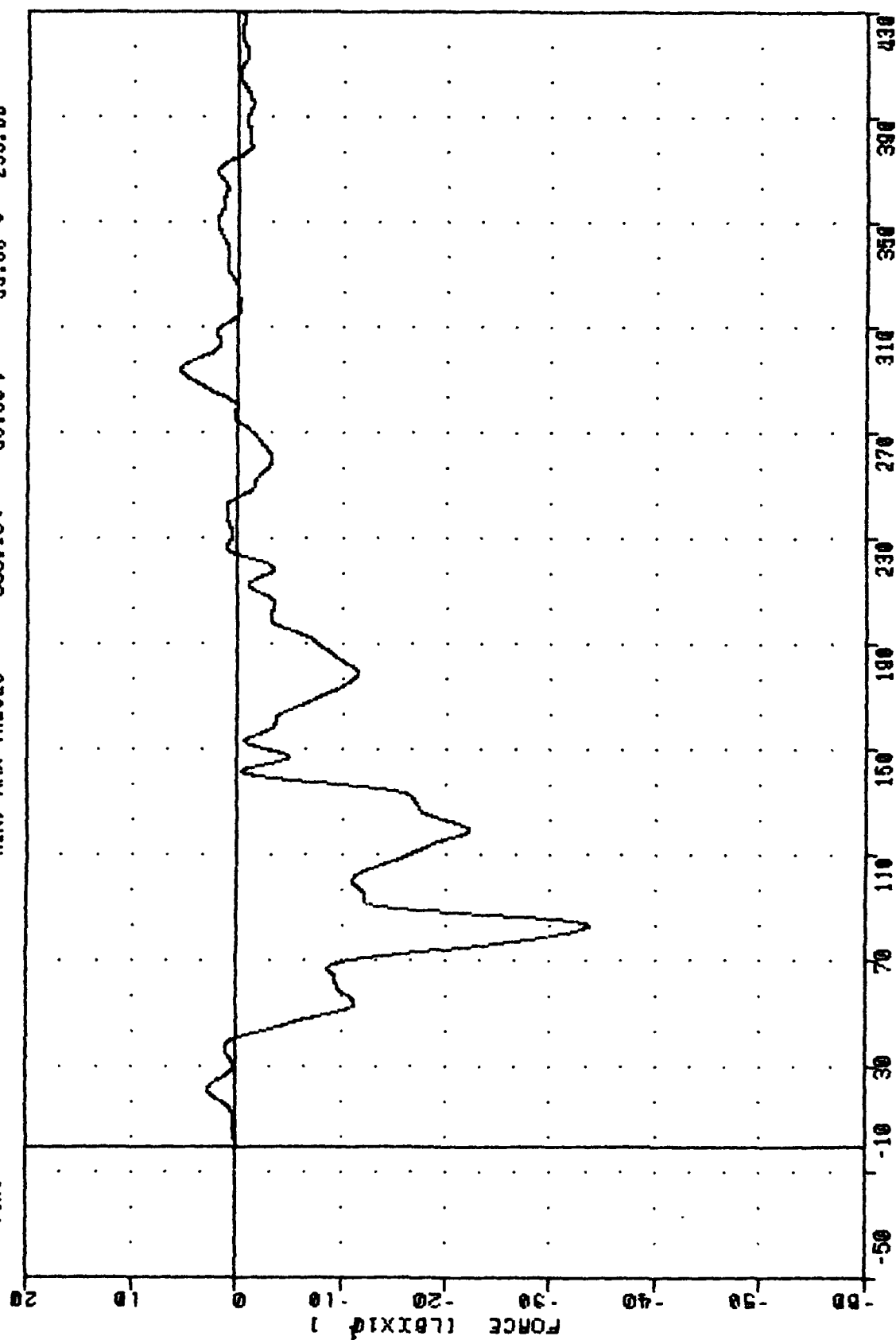
FAR
91025
T4HS

. TEST 003

. OVERHEAD LUGGAGE BIN TEST

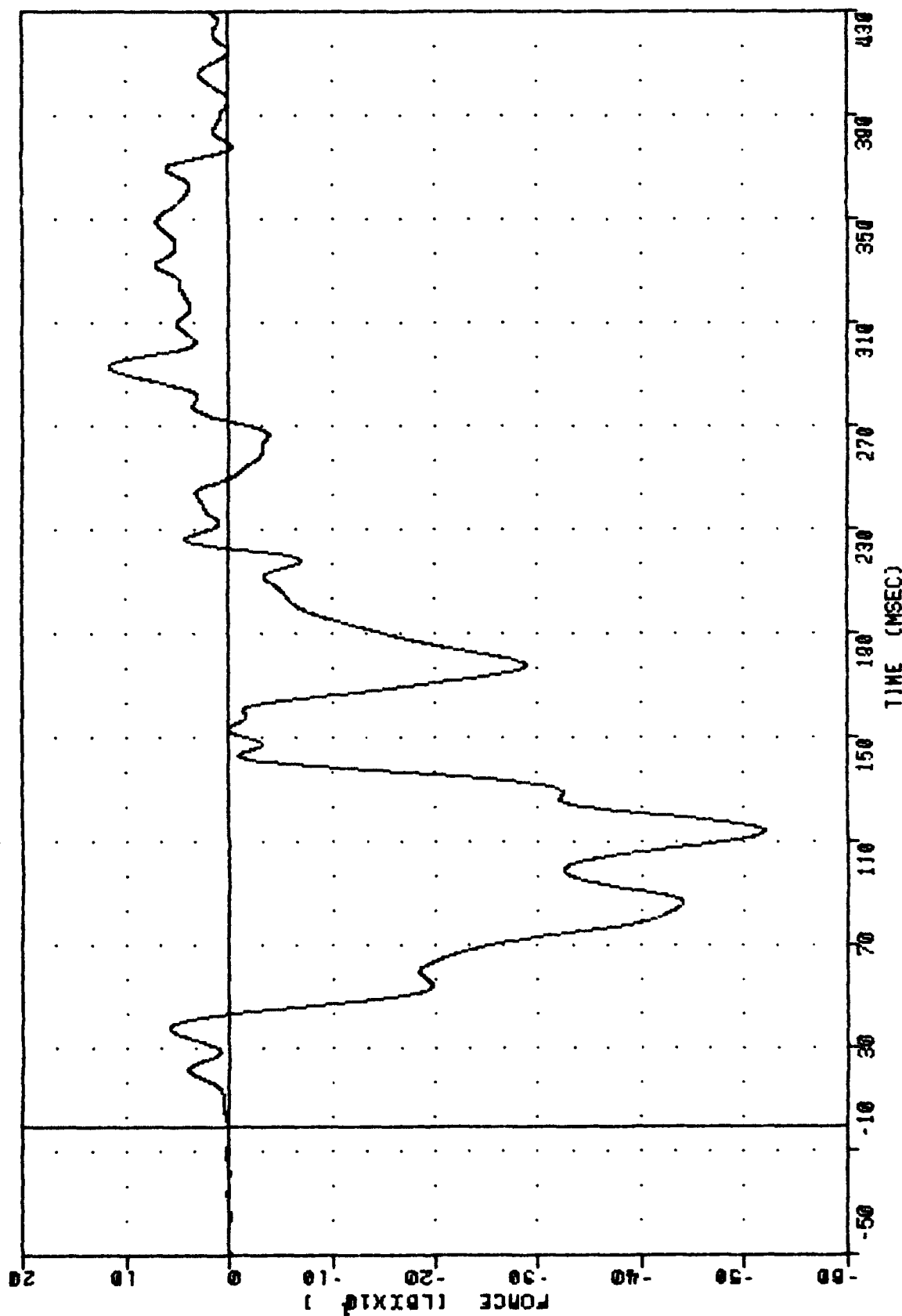
FILTER = 8LPF 100/ 316/ -40

MIN, MAX VALUES = -336.16 83.30 33.88 293.88



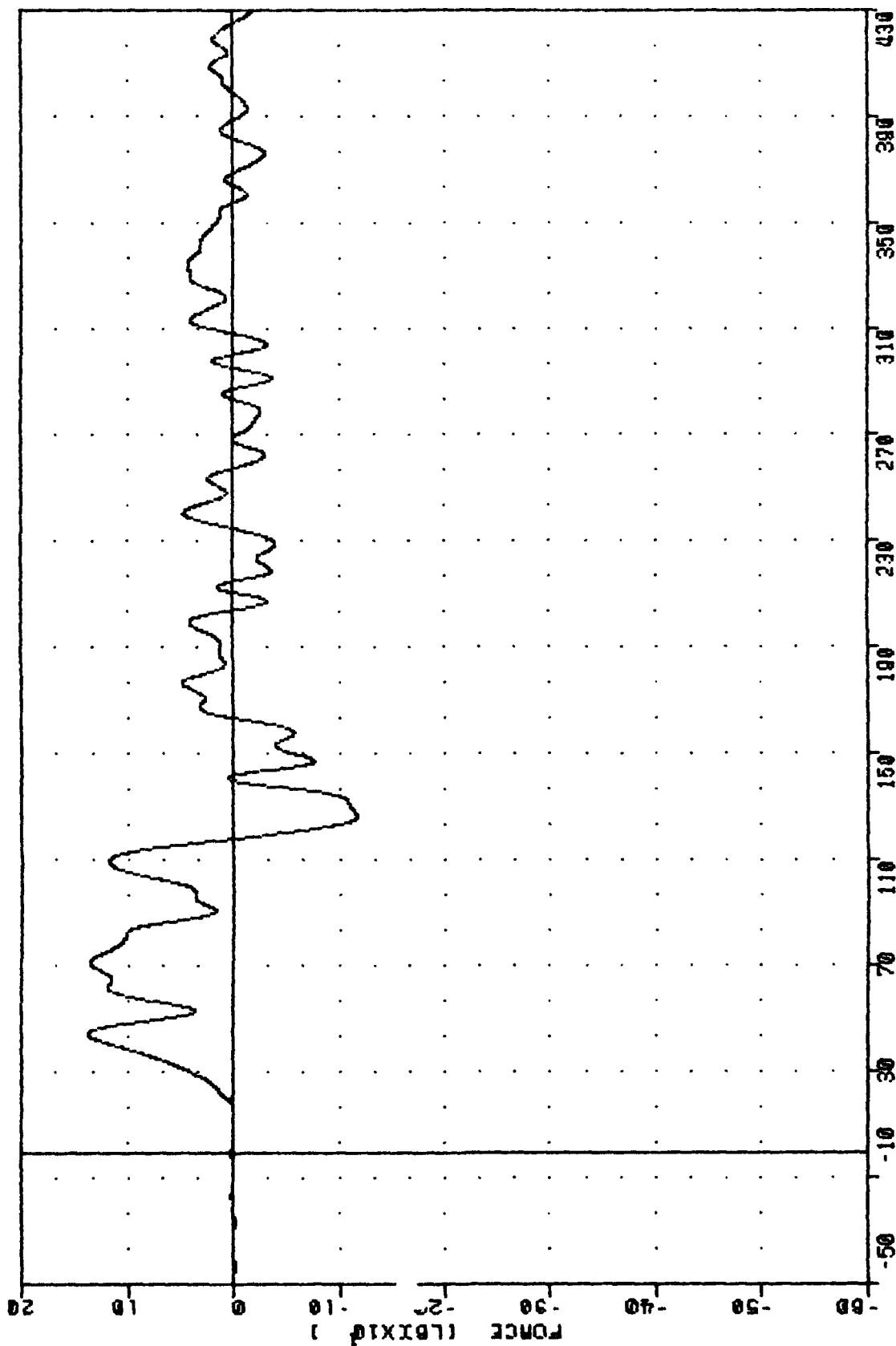
TIME (MSEC)
OVERHEAD LUGGAGE BIN 13.2G DYNAMIC TEST
BIN A TURNBUCKLE 4H FORCE

FAR 91025 73H3 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -519.74 114.38, 110.47 293.25



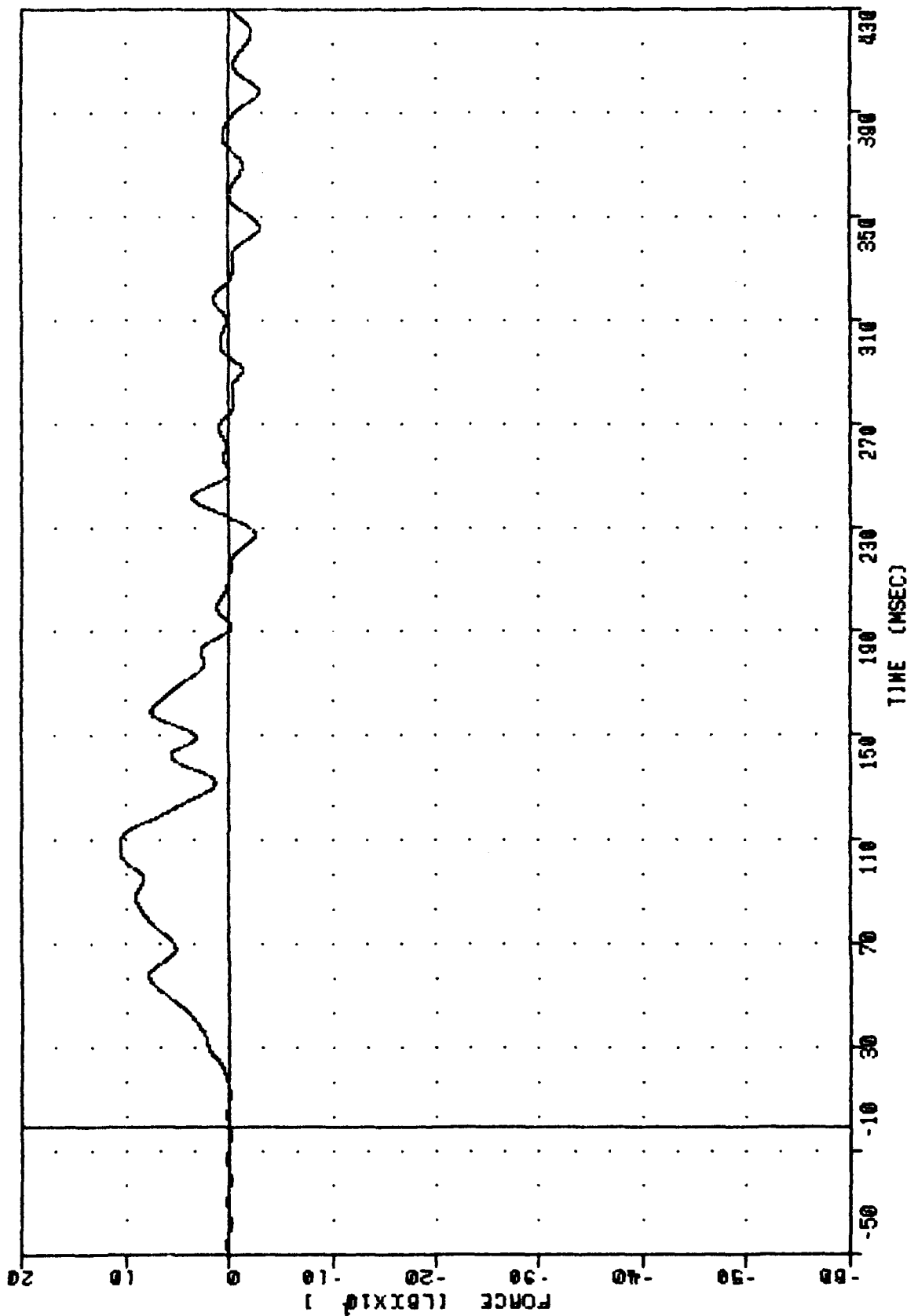
OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 BIN A TURNBUCKLE 5H FORCE

FRA 91025
 T6H3
 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -116.90 126.88 , 137.49 44.58



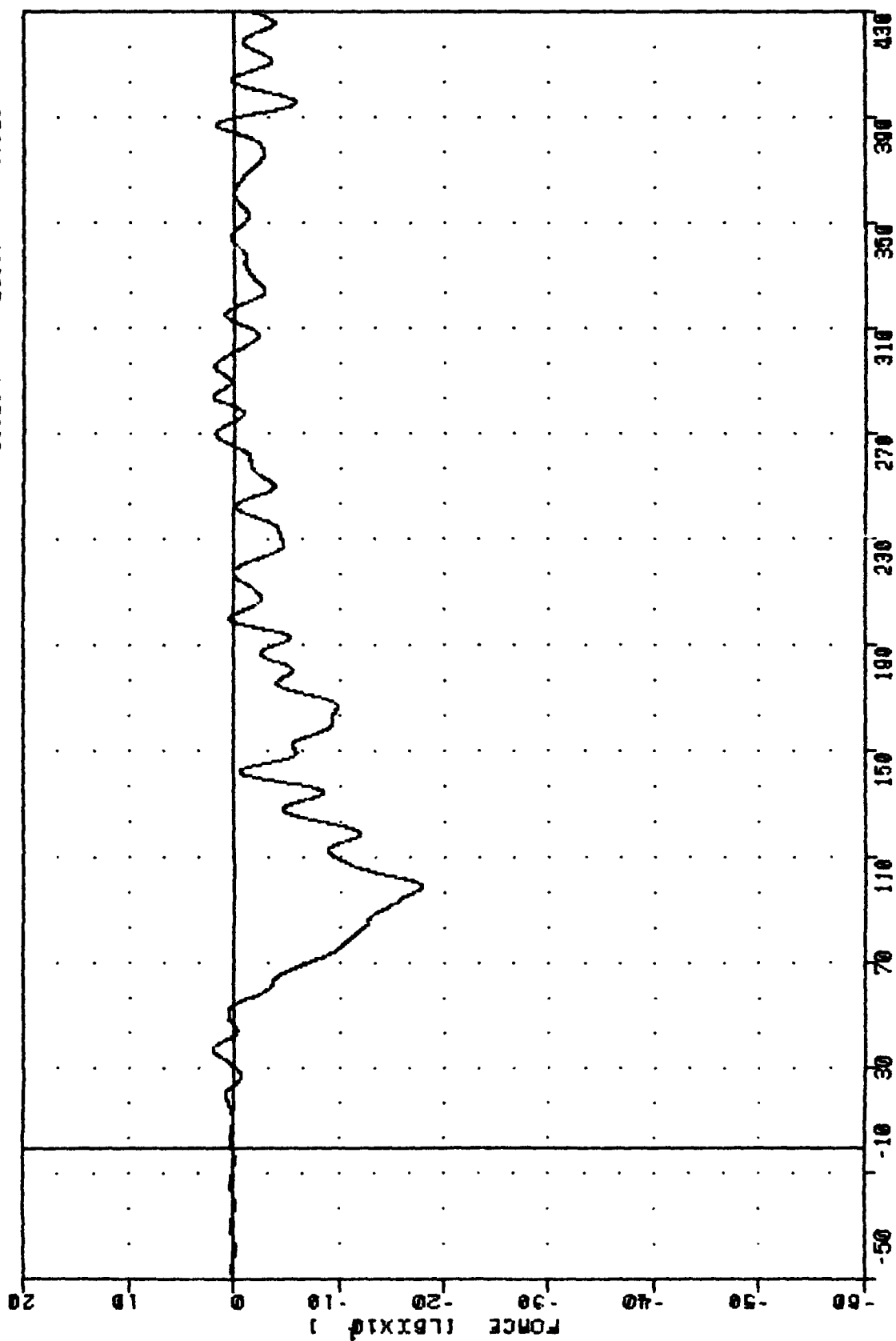
OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 BIN A TURNBUCKLE 6H FORCE

FRA 91025 77HS . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -30.64 398.25 , 104.65 e 105.25



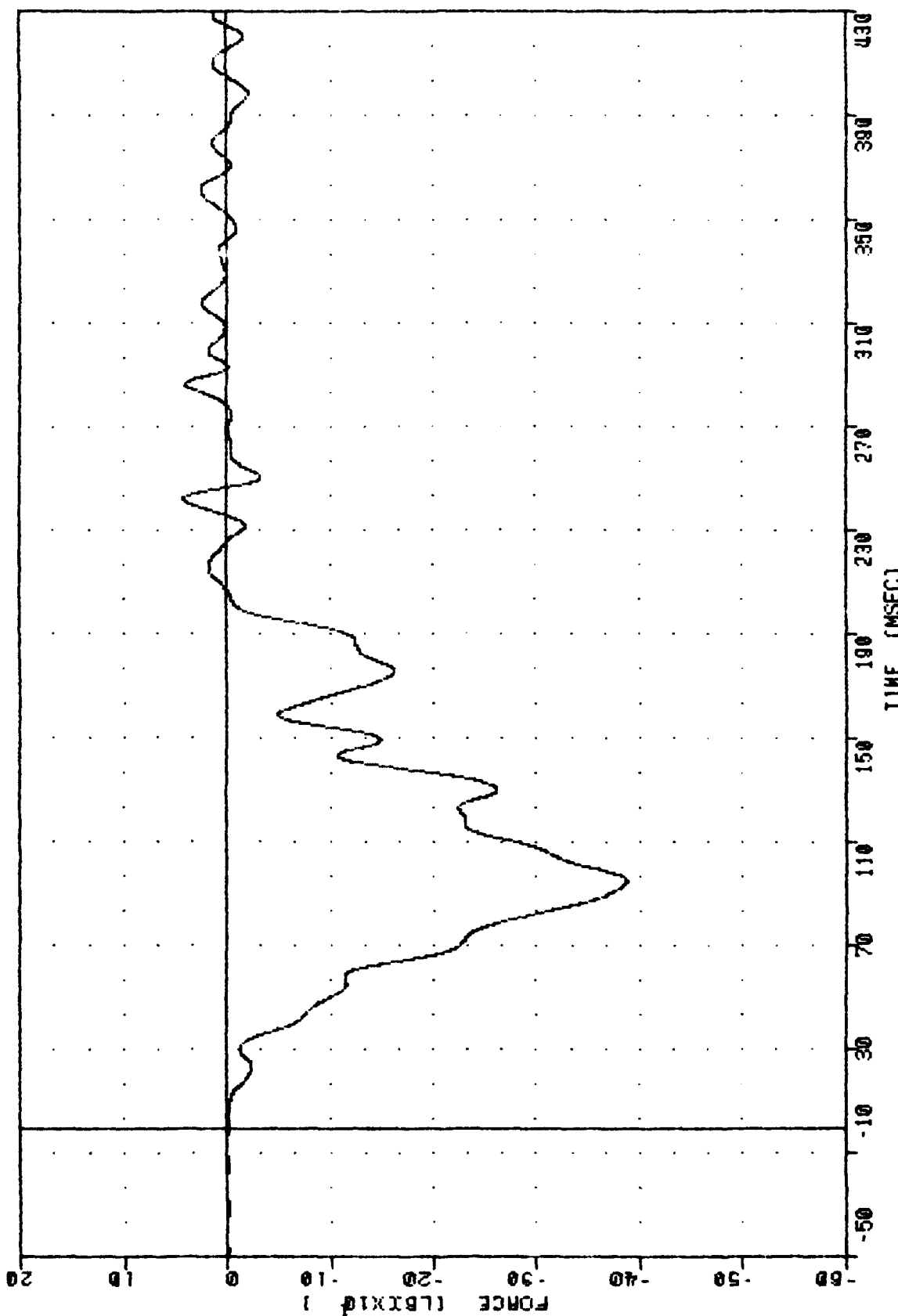
OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 BIN A TURNBUCKLE 7H FORCE

FAR 91025
 T8H3
 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -178.78 99.25 , 20.17 97.25



TIME (MSEC)
 OVERHEAD LUGGAGE BIN 13.2G DYNAMIC TEST
 BIN A TURNBUCKLE 8H FORCE

FRA 91025
 T9H3
 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -387.60 41.64 242.15



OVERHEAD LUGGAGE BIN 13.25 DYNAMIC TEST
 BIN A TURNBUCKLE 9H FORCE

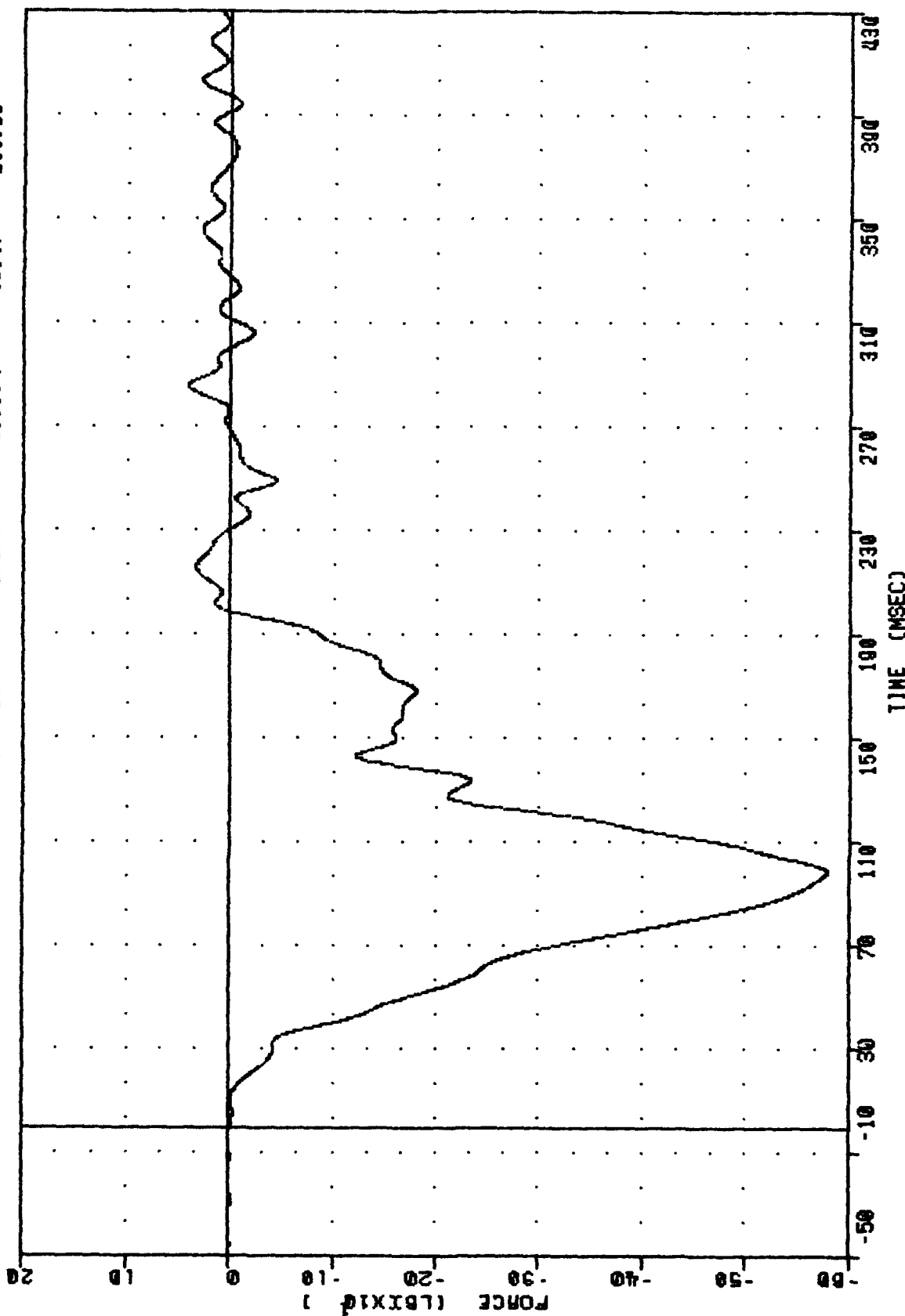
FRA
91025
T10H3

. TEST 003

. OVERHEAD LUGGAGE BIN TEST

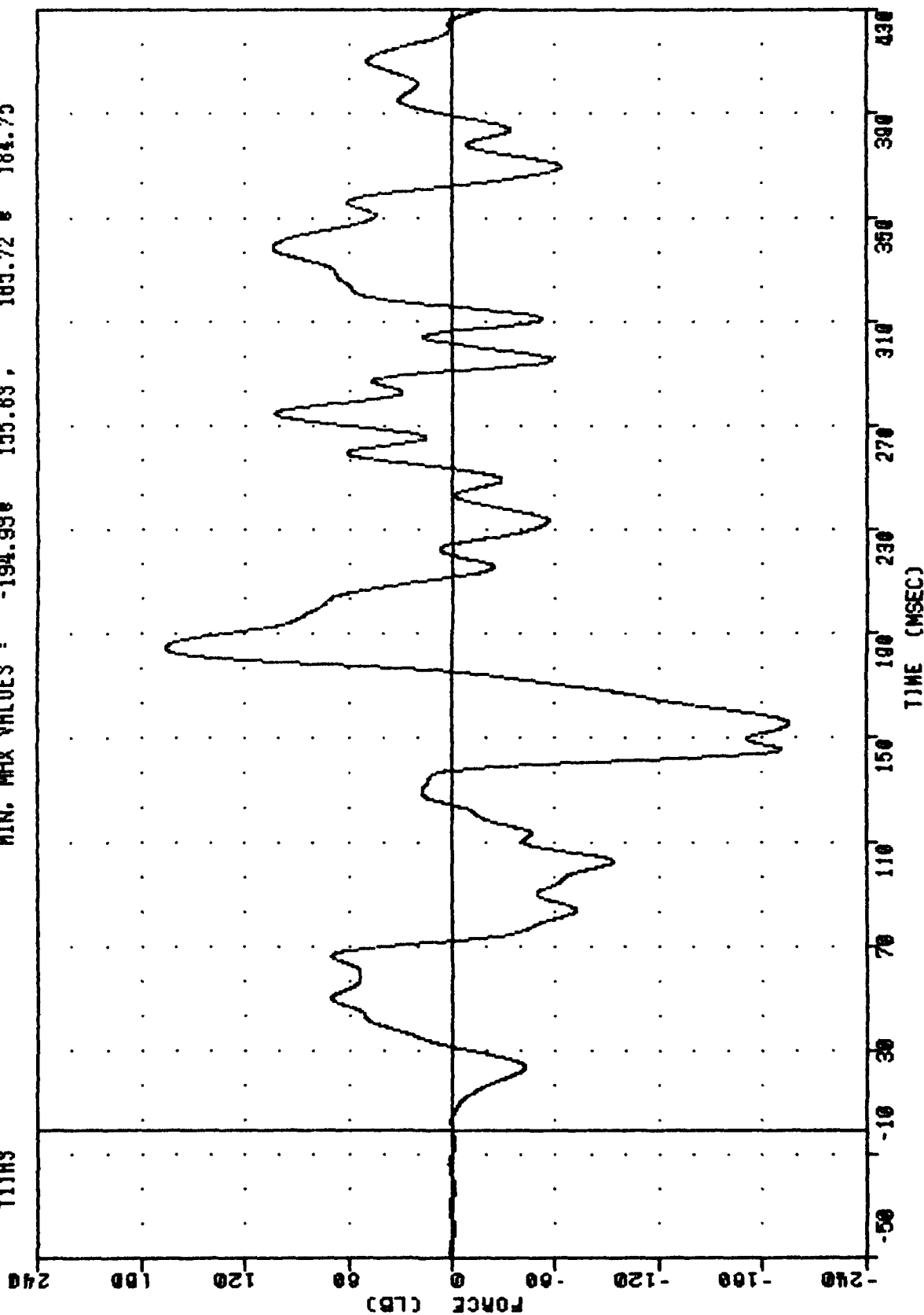
FILTER - BLPF 100/ 316/ -40

MIN. MAX VALUES : -578.71 98.50 , 40.47 285.65



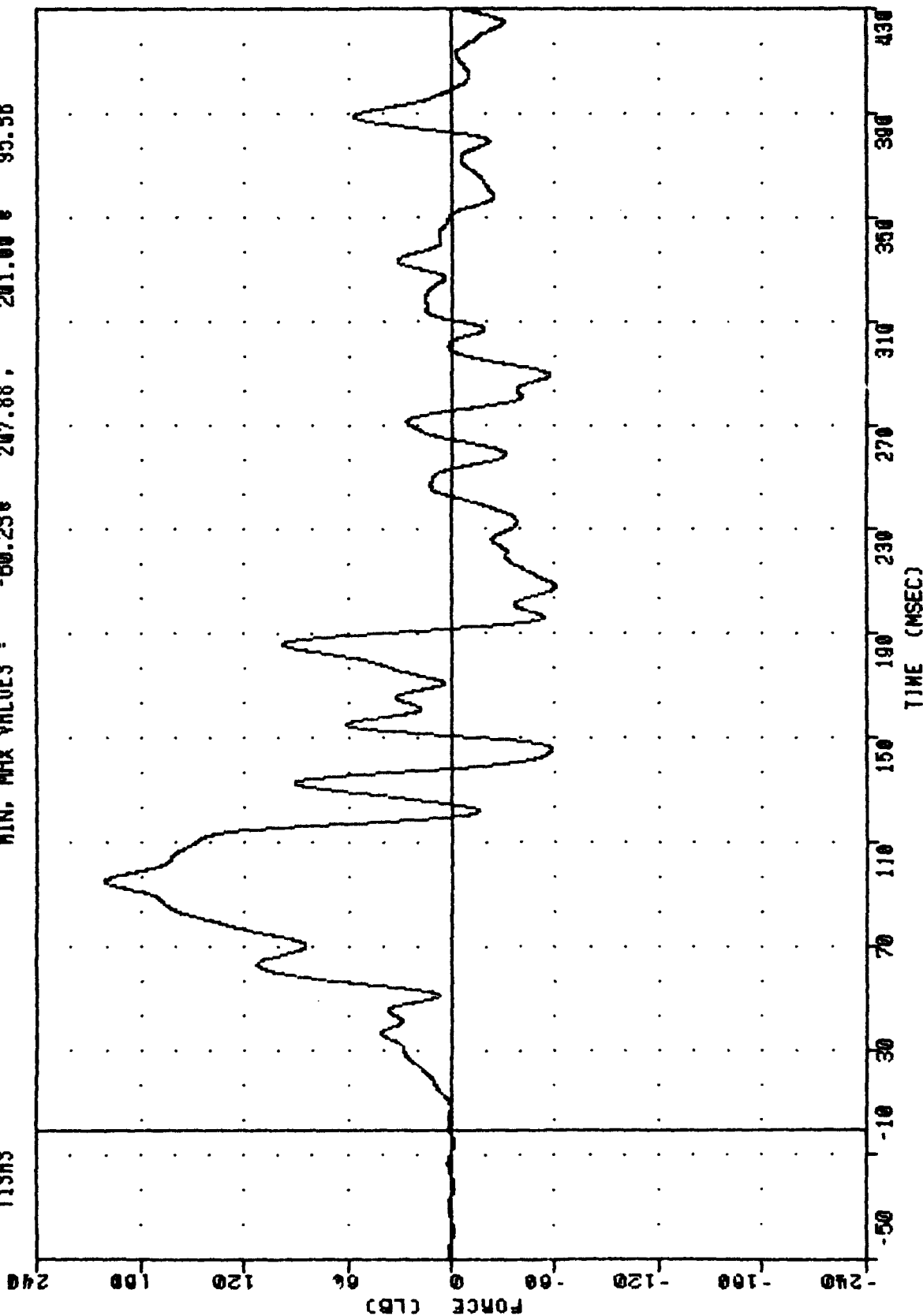
OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
BIN A TURNBUCKLE 10H FORCE

FRA
 91025
 T11H3
 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -194.93 155.63 , 103.72 184.75



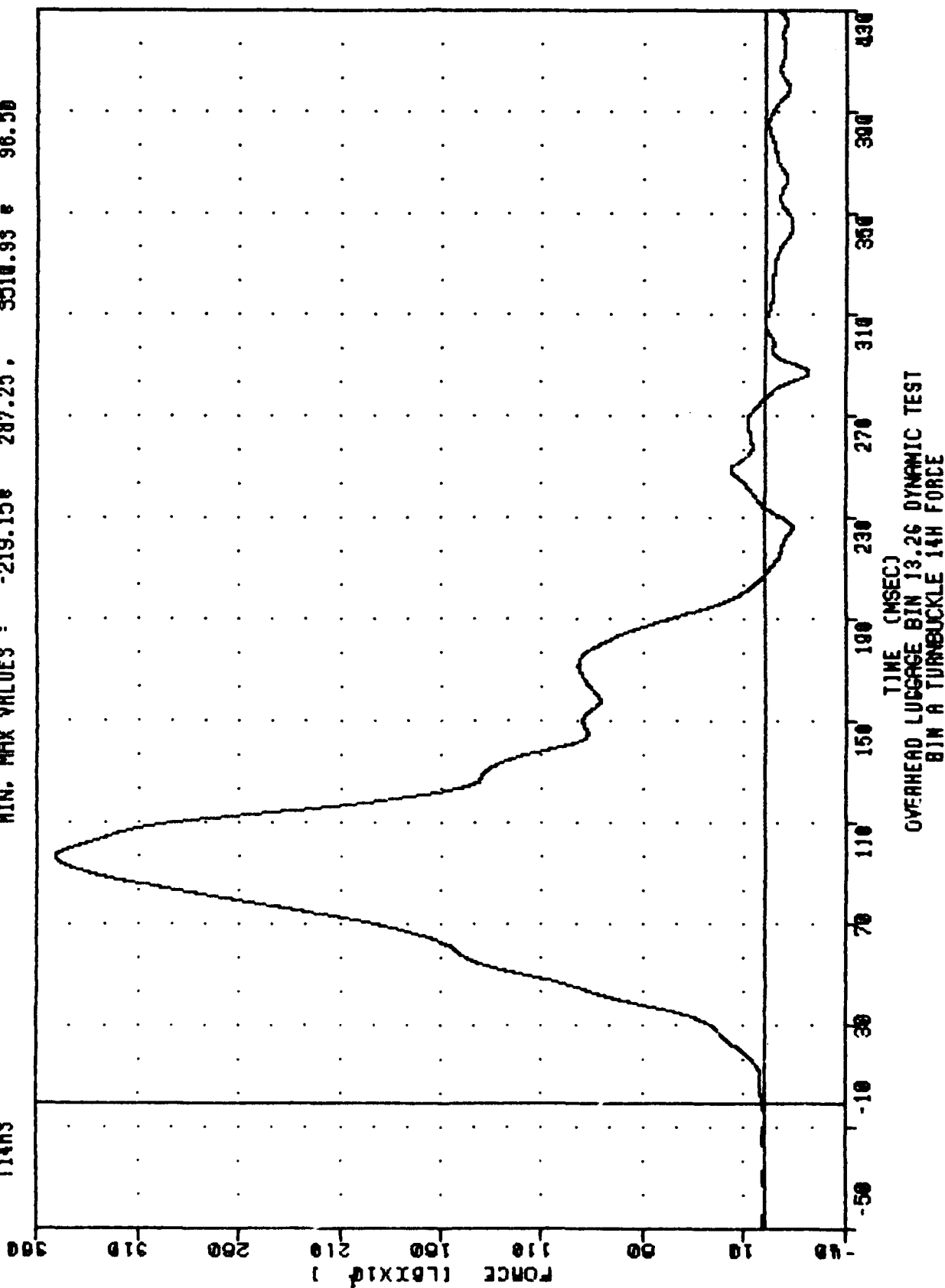
OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 BIN A TURNBUCKLE 1TH FORCE

FRA 91025 T13H3 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -60.23 207.86, 201.00 95.58

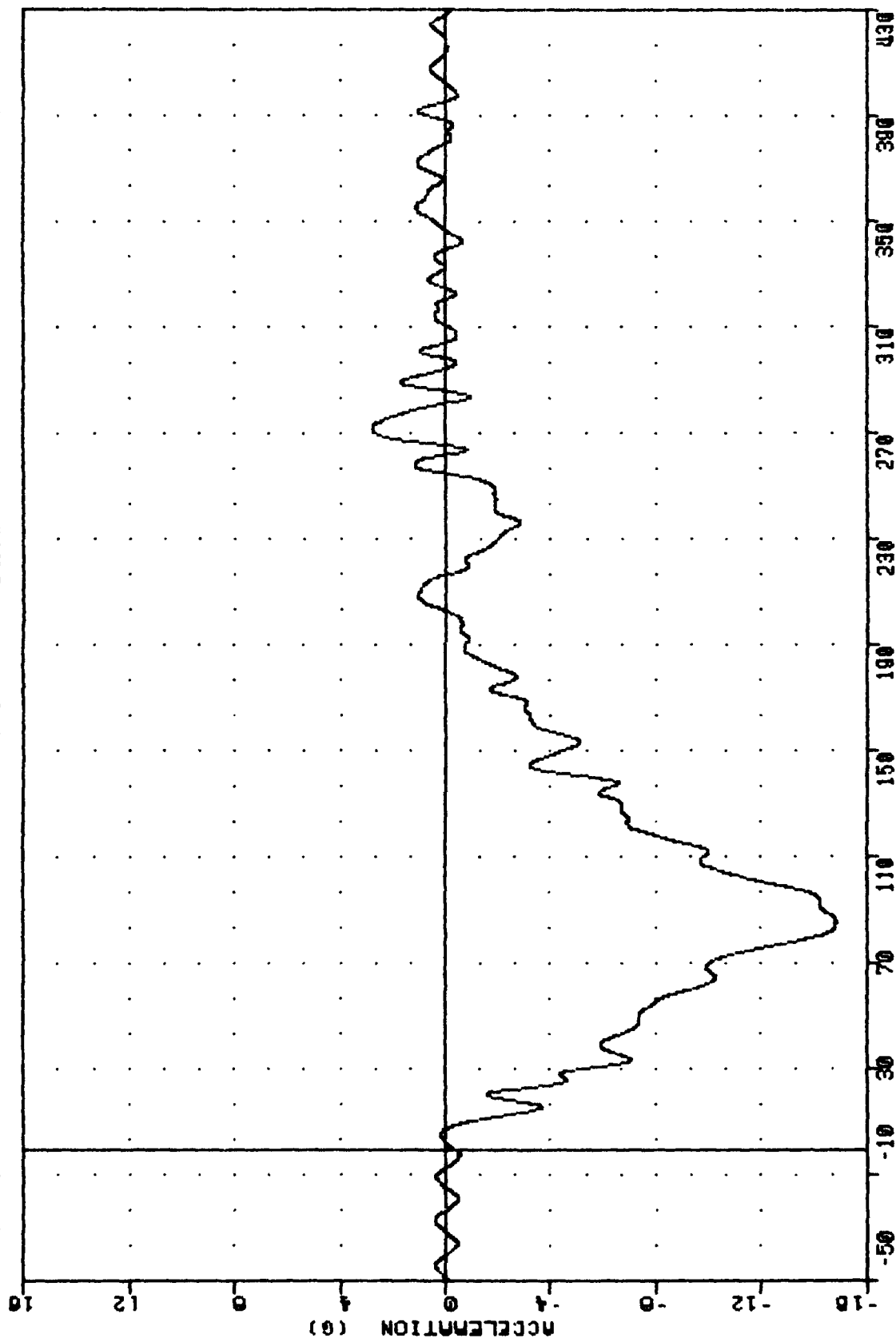


OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 BIN A TURNBUCKLE 13H FORCE

FAR 91025
 T14HS
 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -219.15 287.25 . 3510.93 96.50

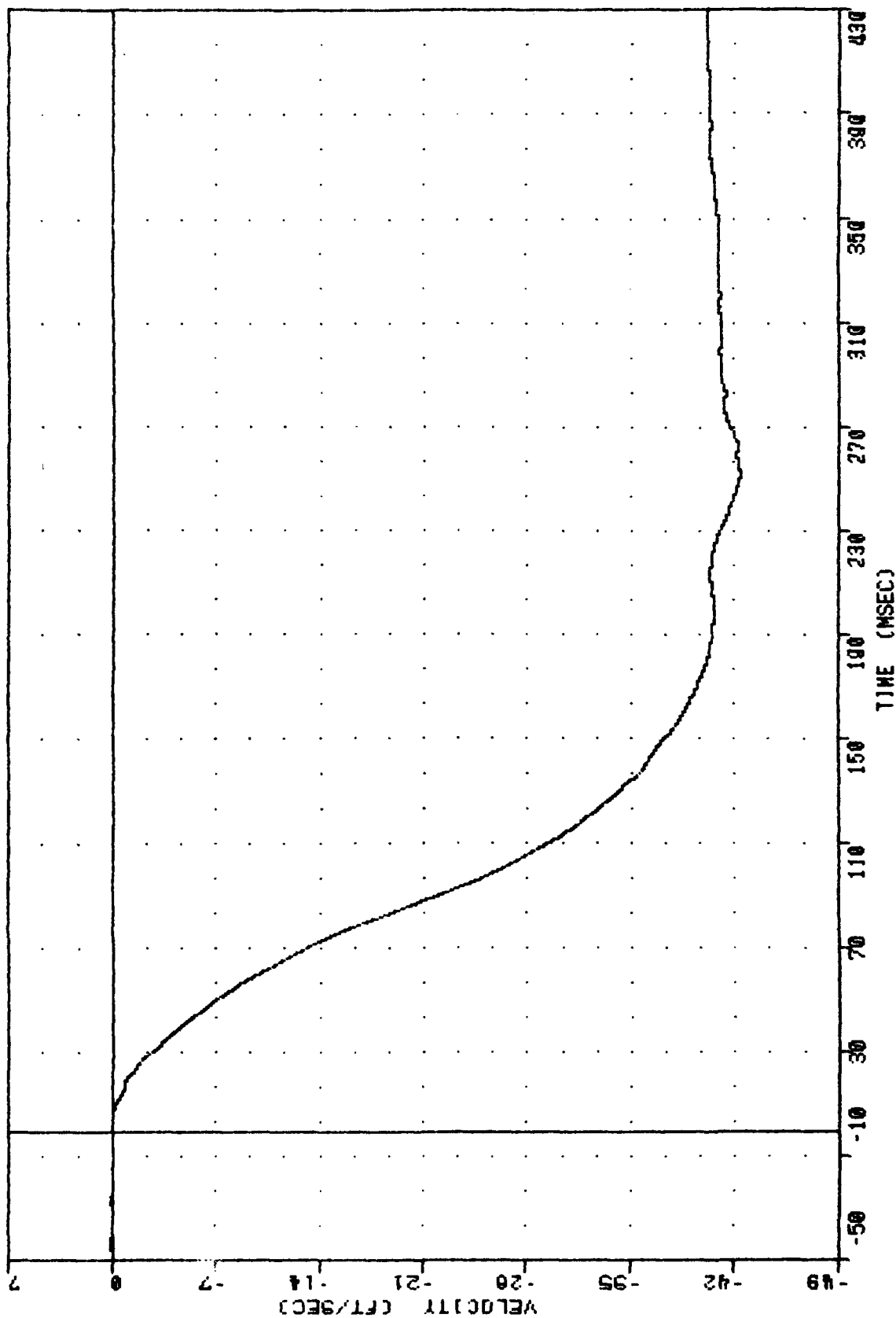


FFA . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 91025 FILTER - BLPF 100/ 316/ -40
 FLFX6 MIN. MAX VALUES : -14.85 85.63 . 2.78 e 272.00



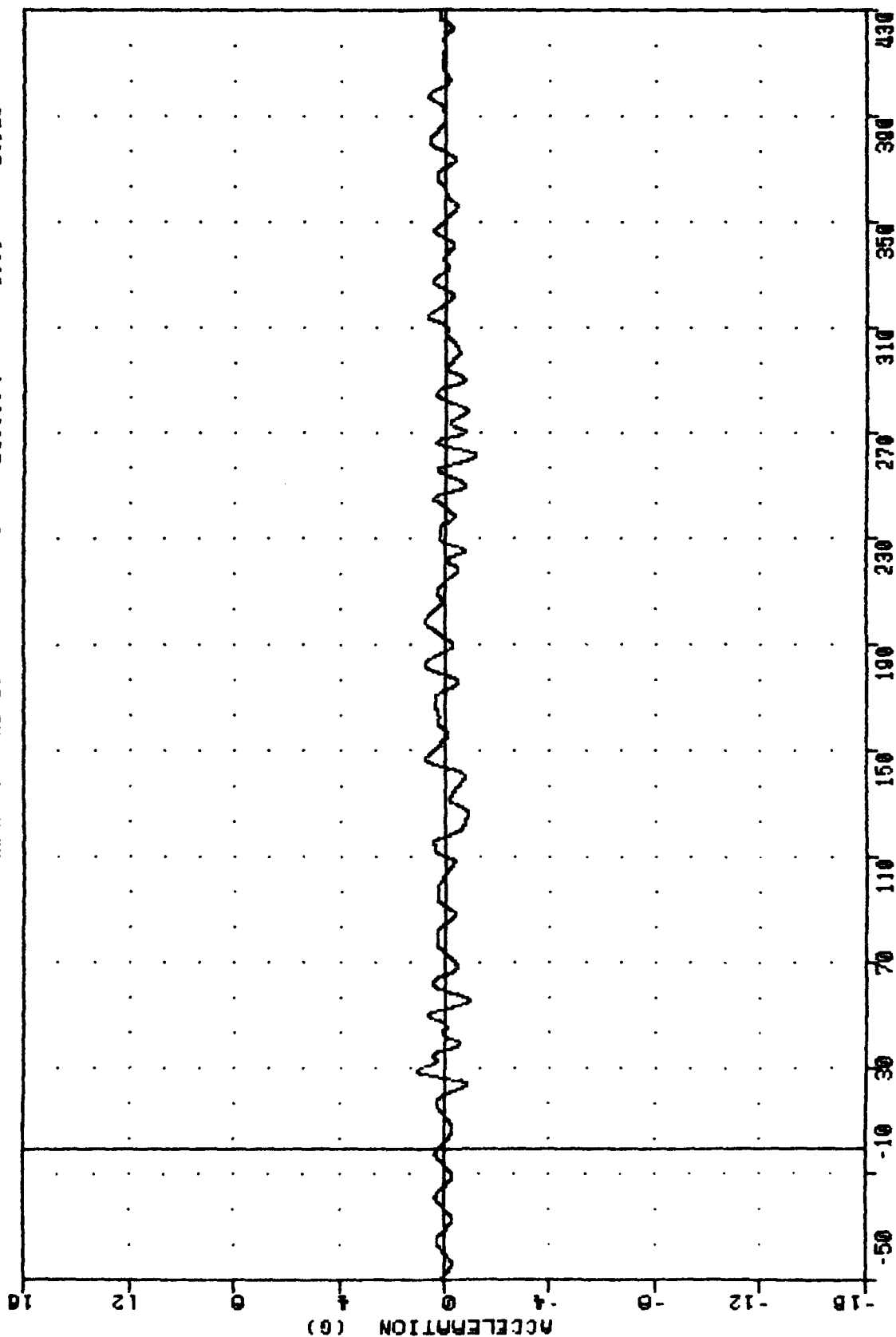
TIME (MSEC)
 OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 FLOOR FORWARD LONGITUDINAL ACCELERATION

FRR
 91025
 FLFXV
 . TEST 003
 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 300/ 949/ -40
 MIN. MAX VALUES : -42.59e 252.50 , 0.05 e -44.25



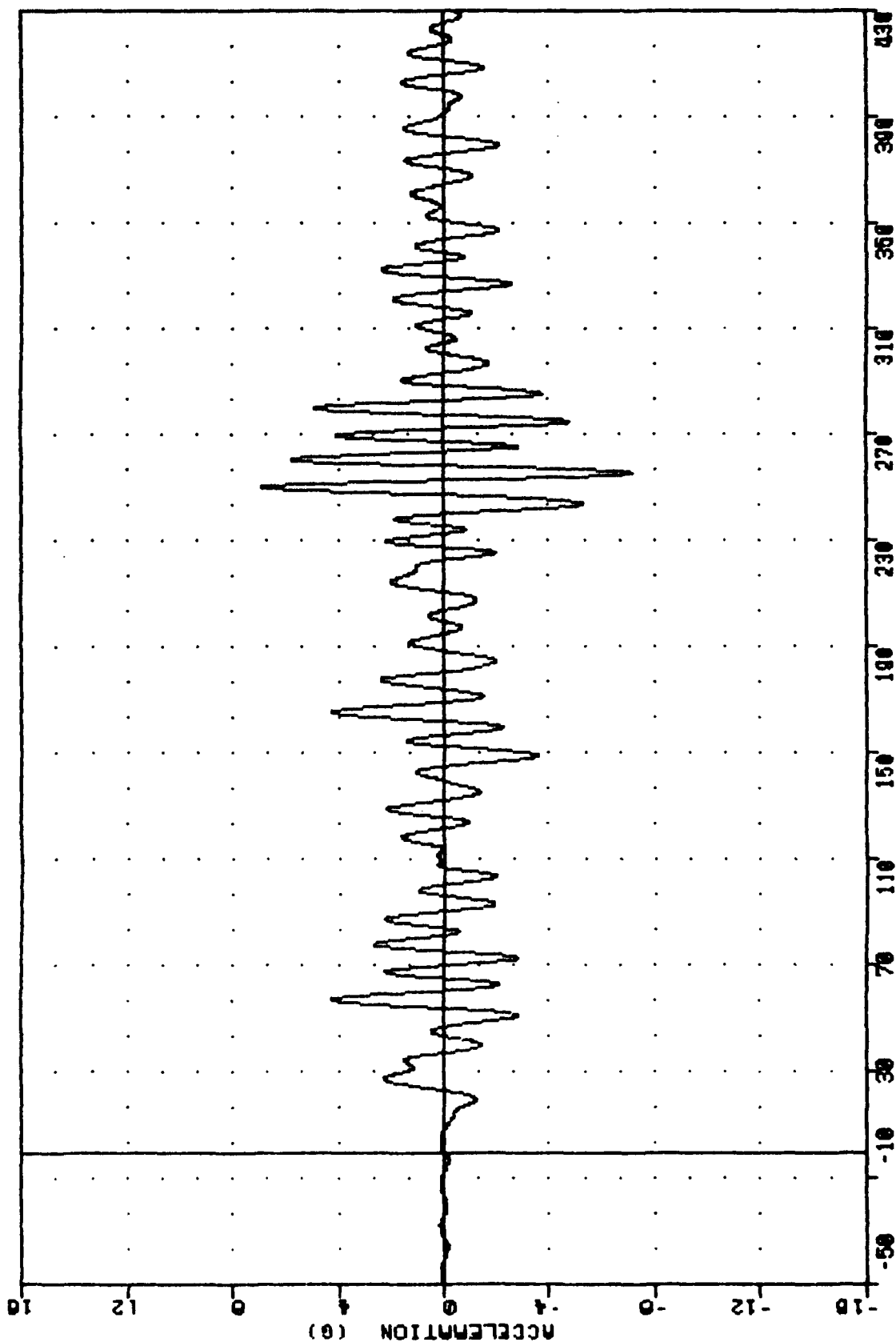
OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 FLOOR FORWARD LONGITUDINAL VELOCITY

FAR 91025
 FLFY6
 TEST 003
 OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -1.10e 201.38, 1.05 e 29.25



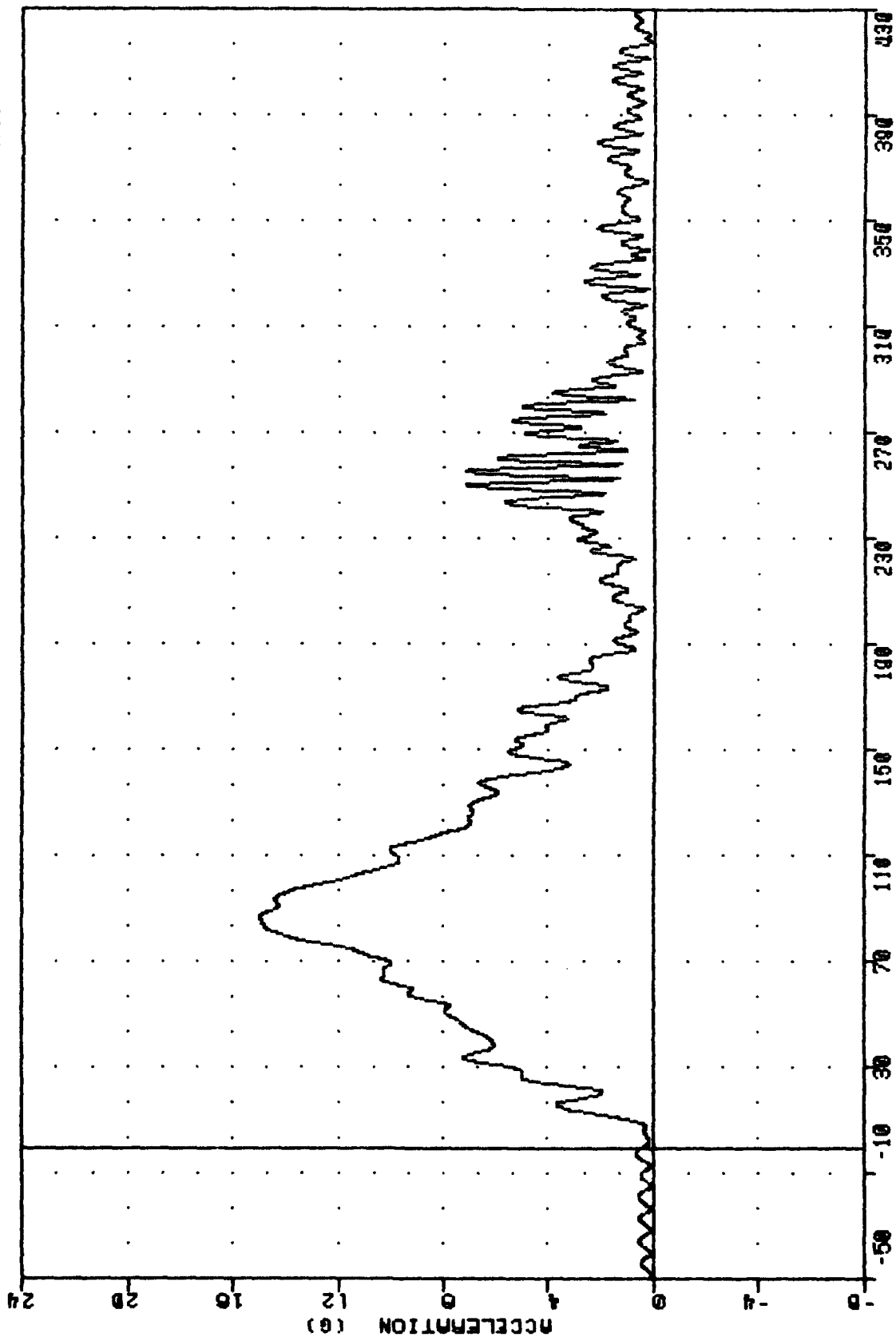
OVERHEAD LUGGAGE BIN 13.2G DYNAMIC TEST
 FLOOR FORWARD LATERAL ACCELERATION

FRA . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 91025 FILTER - BLPF 100/ 316/ -40
 FLF76 MIN. MAX VALUES : -7.14e 235.50 . 0.00 e 250.25



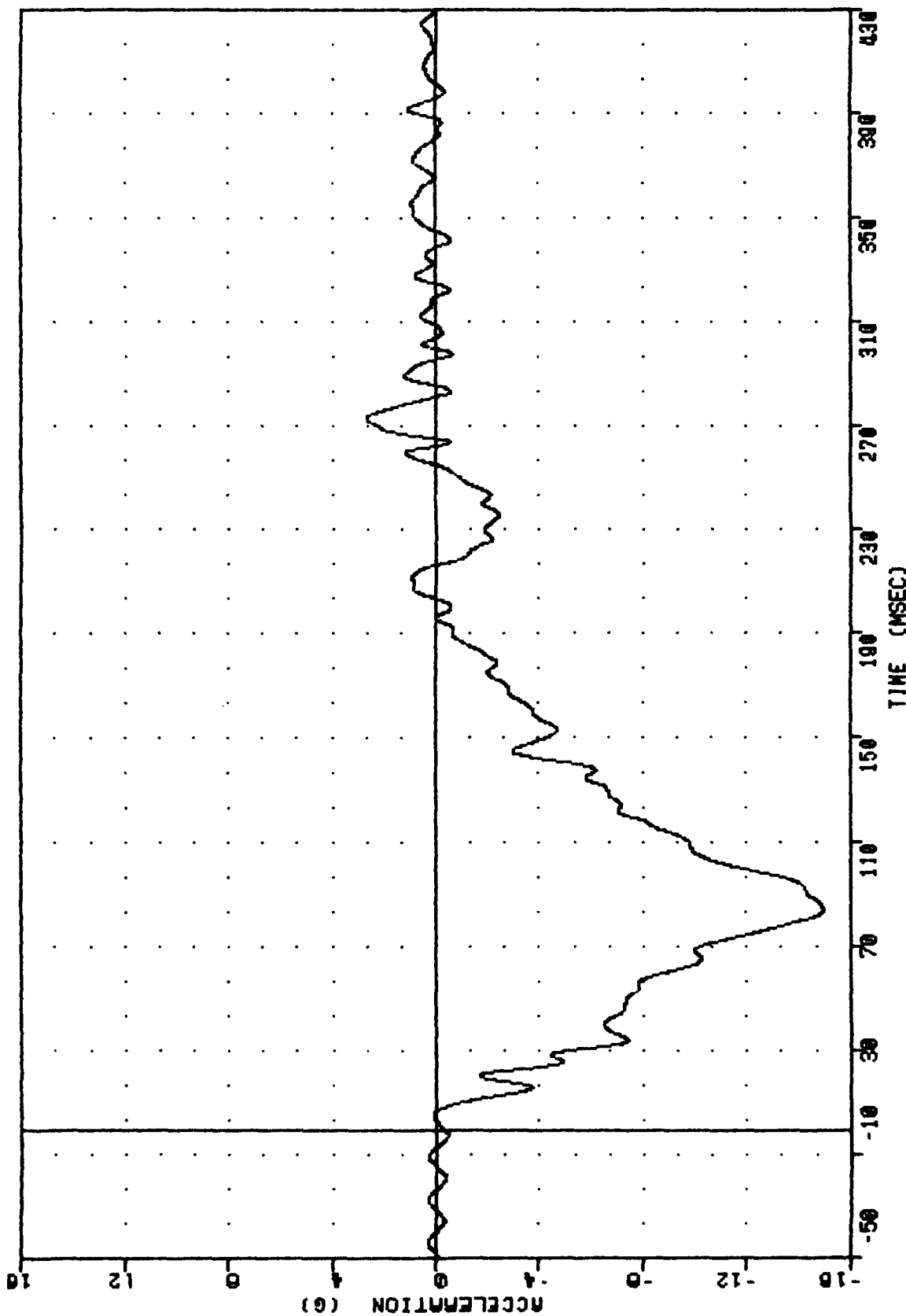
OVERHEAD LUGGAGE BIN 13.2G DYNAMIC TEST
 FLOOR FORWARD VERTICAL ACCELERATION

FRR
 91025
 FLFR6
 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : 0.03e 417.75 , 14.97 e 86.75



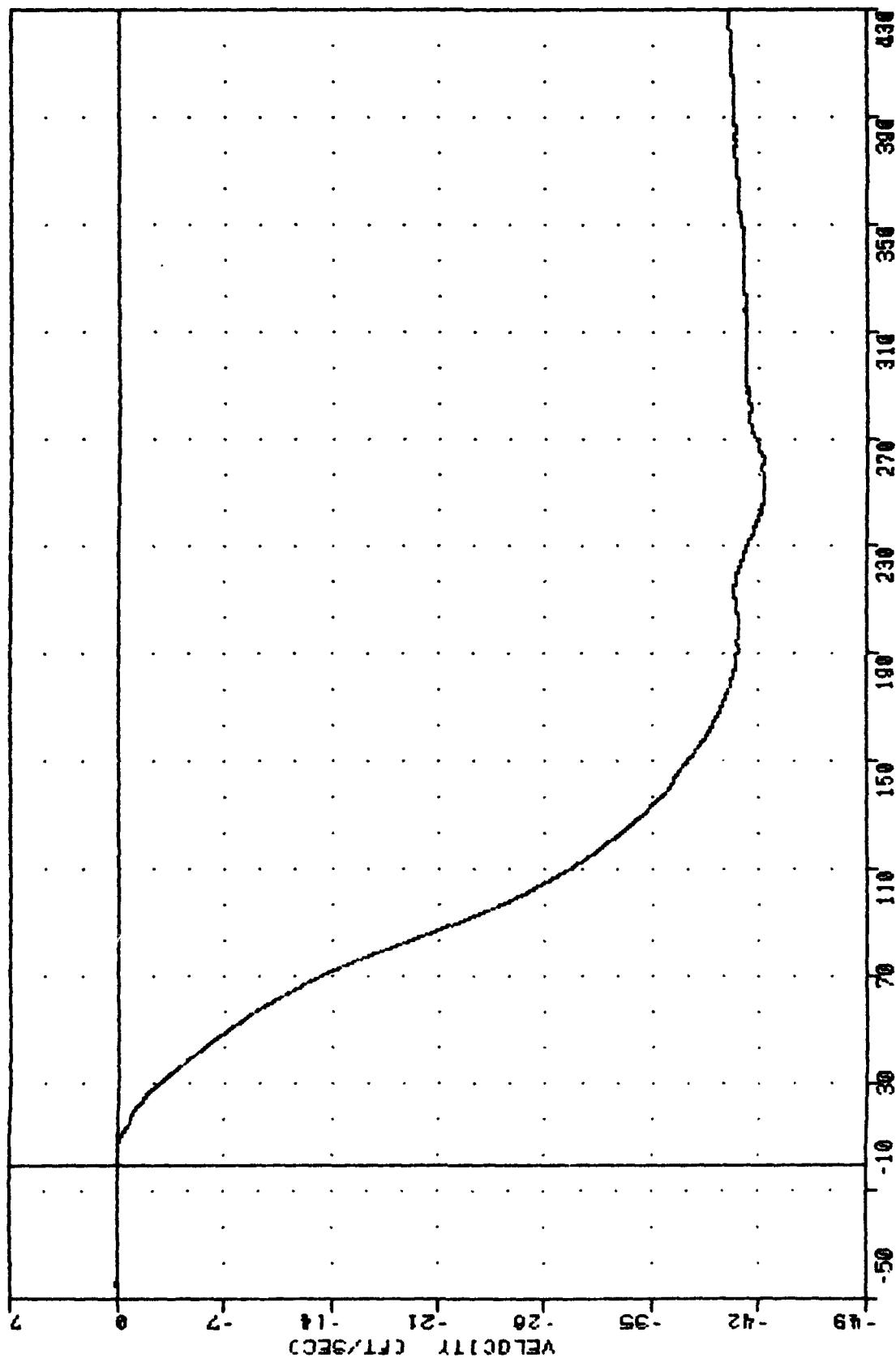
OVERHEAD LUGGAGE BIN 13.2G DYNAMIC TEST
 FLOOR FORWARD RESULTANT ACCELERATION

FRA . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 91025 FILTER - BLPF 100/ 316/ -40
 FLAX6 MIN, MAX VALUES : -14.90g 84.50g 2.60g 273.13



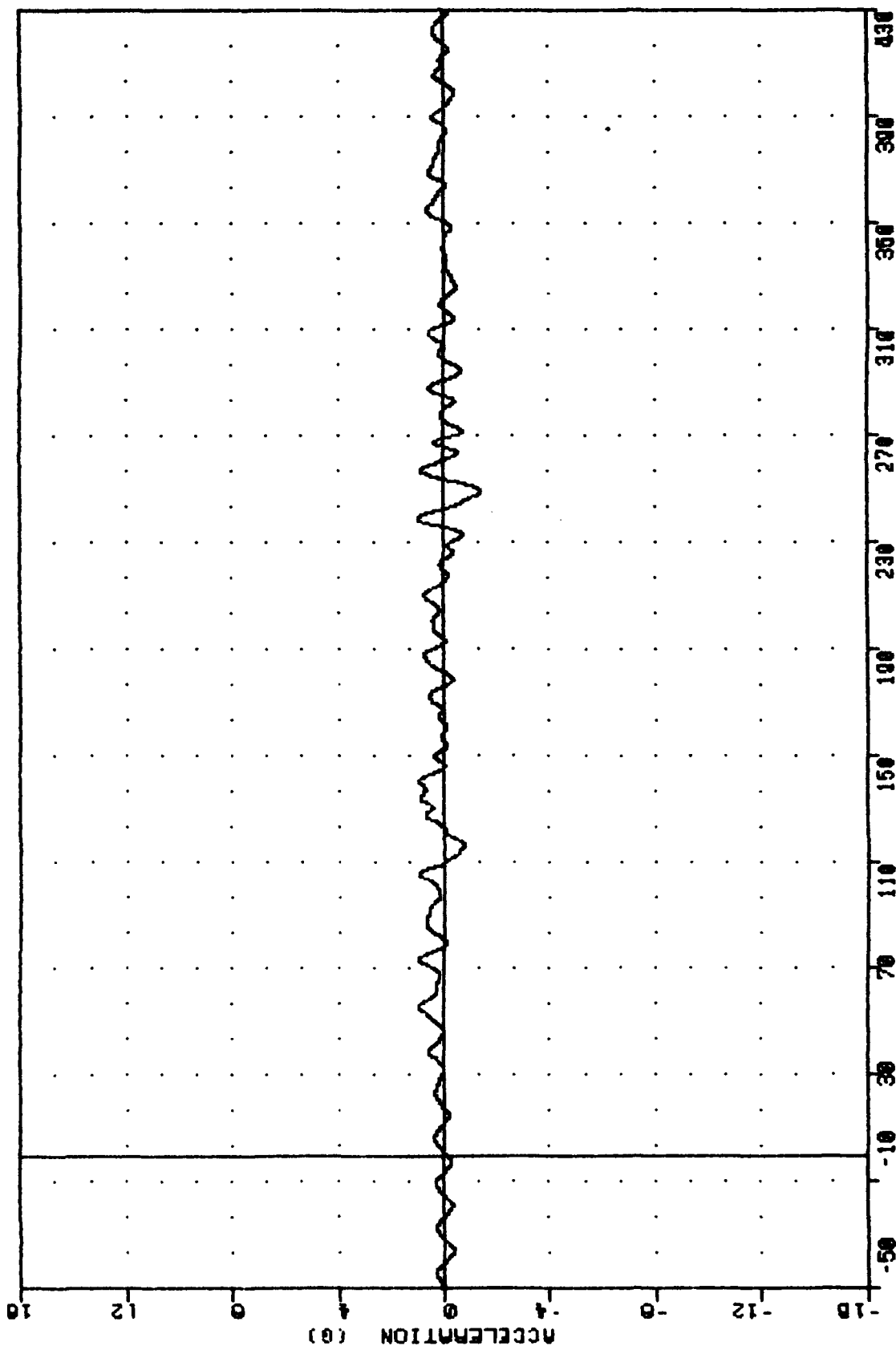
OVERHEAD LUGGAGE BIN 13.2G DYNAMIC TEST
 FLOOR AFT LONGITUDINAL ACCELERATION

FAR 91025 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FLAXY FILTER - 0LPF 300/ 949/ -40
 MIN. MAX VALUES : -42.34e 253.03 , 0.04 e -44.13



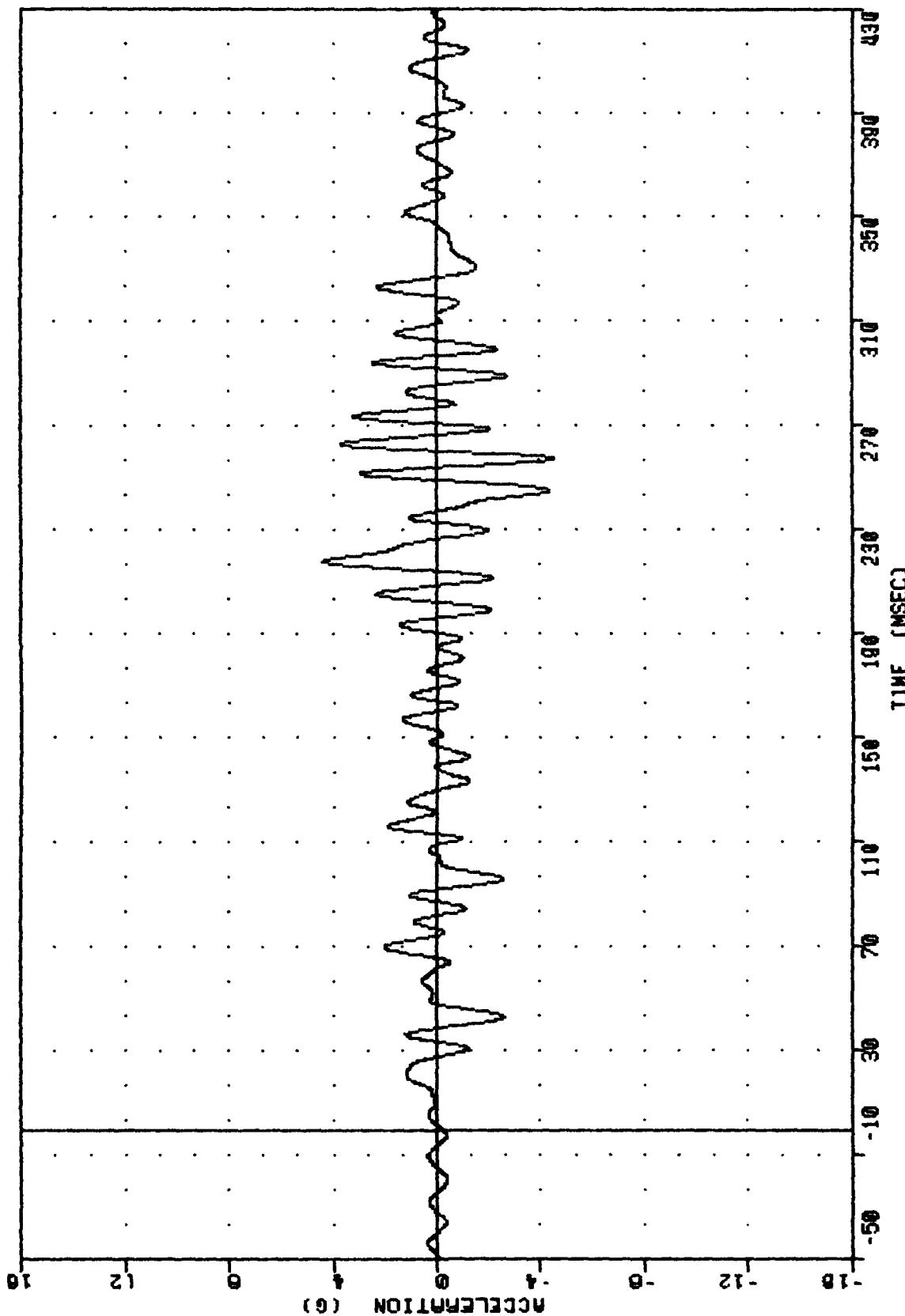
OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 FLOOR AFT LONGITUDINAL VELOCITY

FRR 91025
 FLAYS
 . TEST 0003 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES = -1.438 249.13, 0.98 239.00



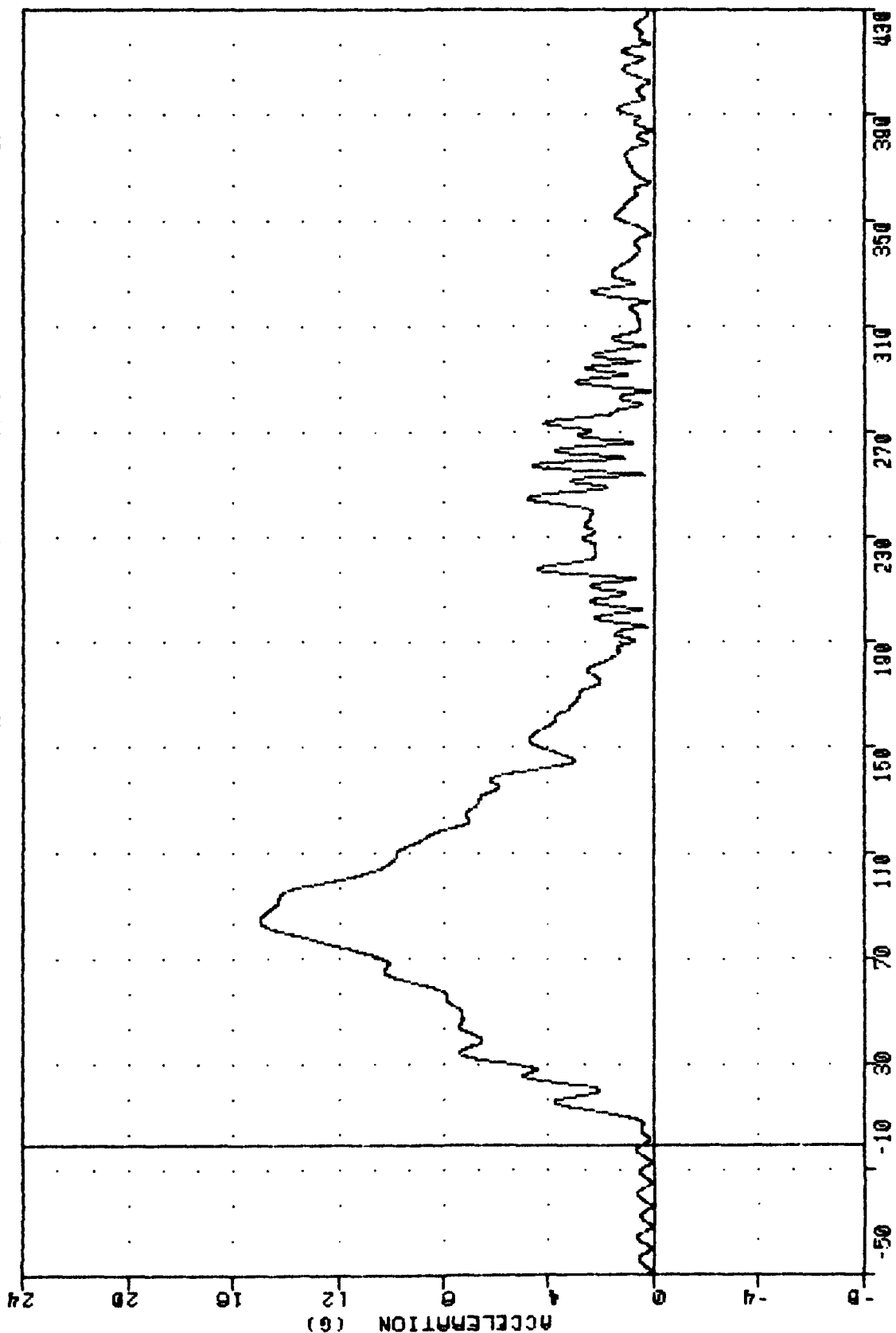
OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 FLOOR AFT LATERAL ACCELERATION

FRA 91025
 FLA26
 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -4.52g 257.25 , 4.39 g 216.00



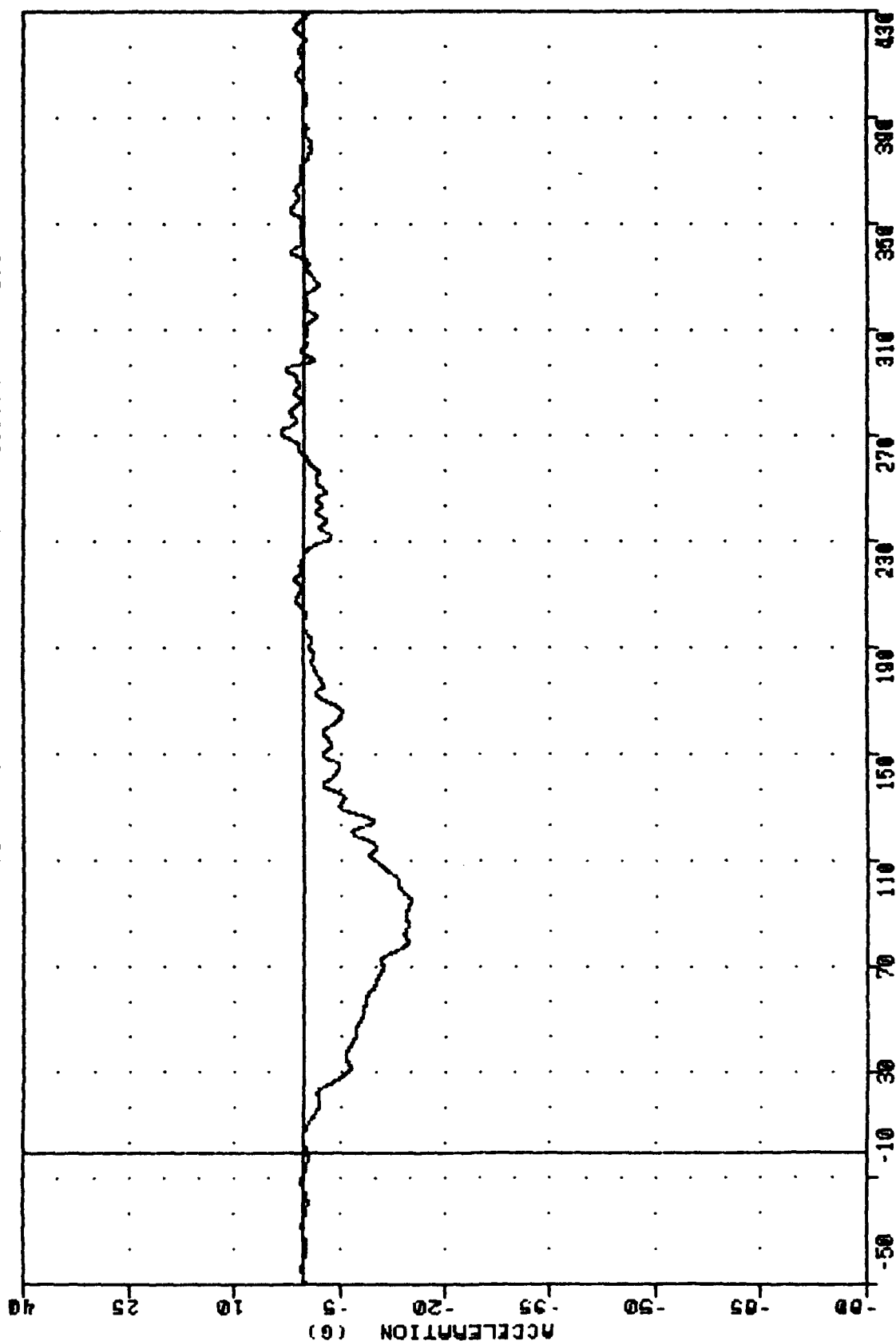
OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 FLOOR AFT VERTICAL ACCELERATION

FAA . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 91025 FILTER - BLPF 100/ 316/ -40
 FLARE MIN, MAX VALUES : 0.03g -31.63, 13.00 g 84.58



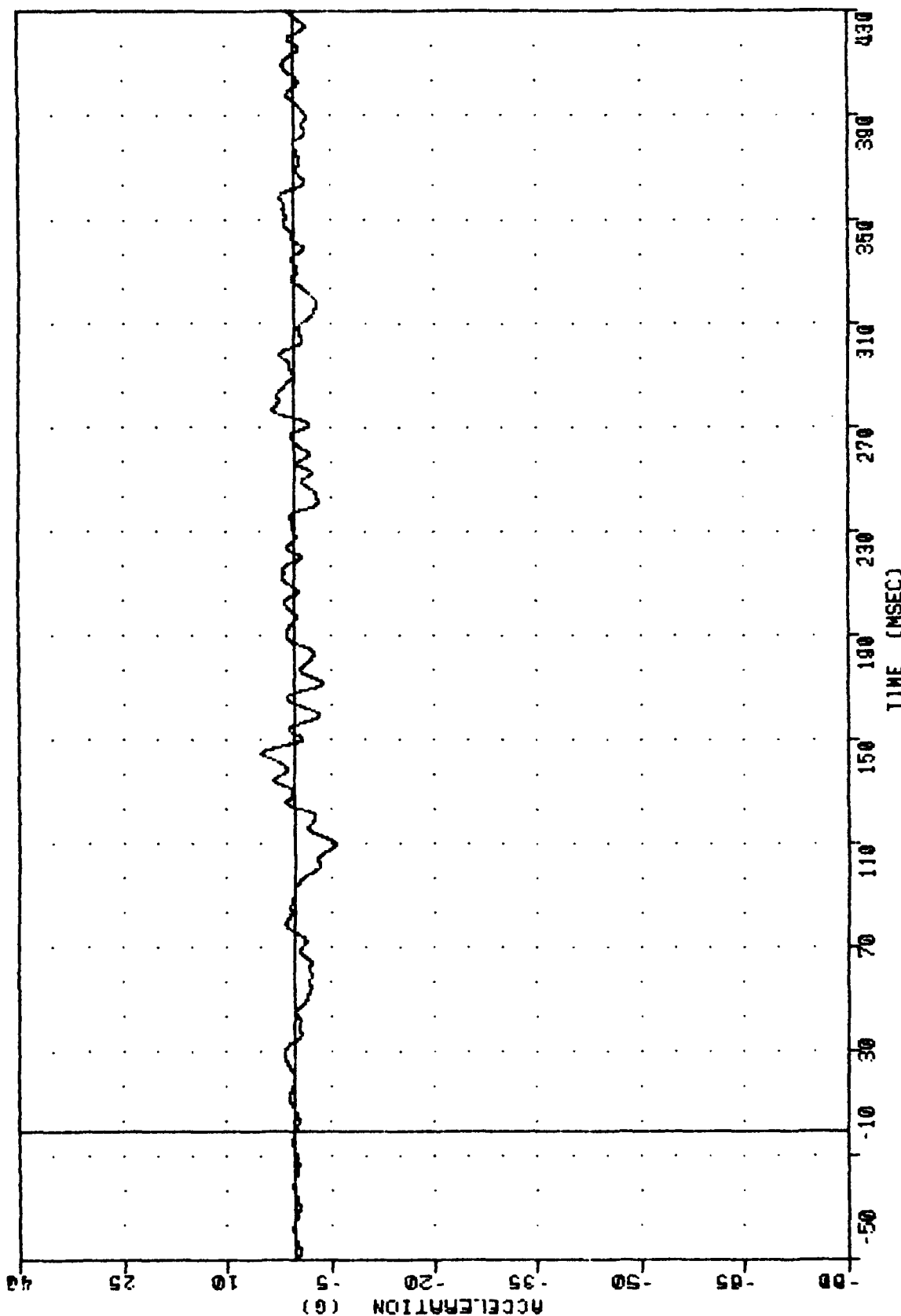
OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 FLOOR AFT RESULTANT ACCELERATION

FRR 91025
 FMTX6
 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -15.03g 95.38g 3.46g 271.58



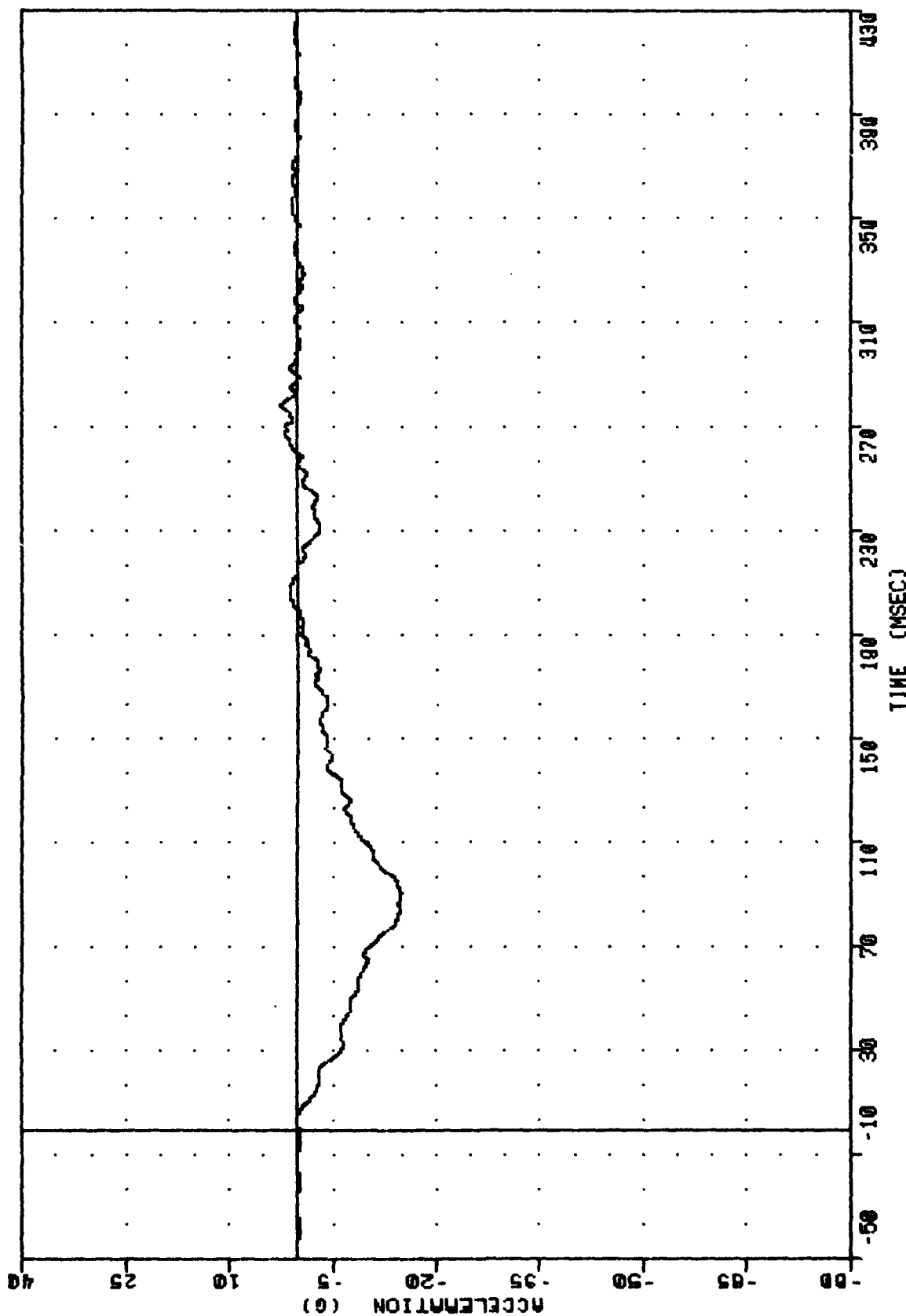
OVERHEAD LUGGAGE BIN 13.2G DYNAMIC TEST
 FUSELAGE MID TOP LONGITUDINAL ACCELERATION

FRA . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 91025 FILTER - BLPF 100/ 316/ -40
 FN126 MIN. MAX VALUES : -5.72g 109.88g 4.93g 145.00g



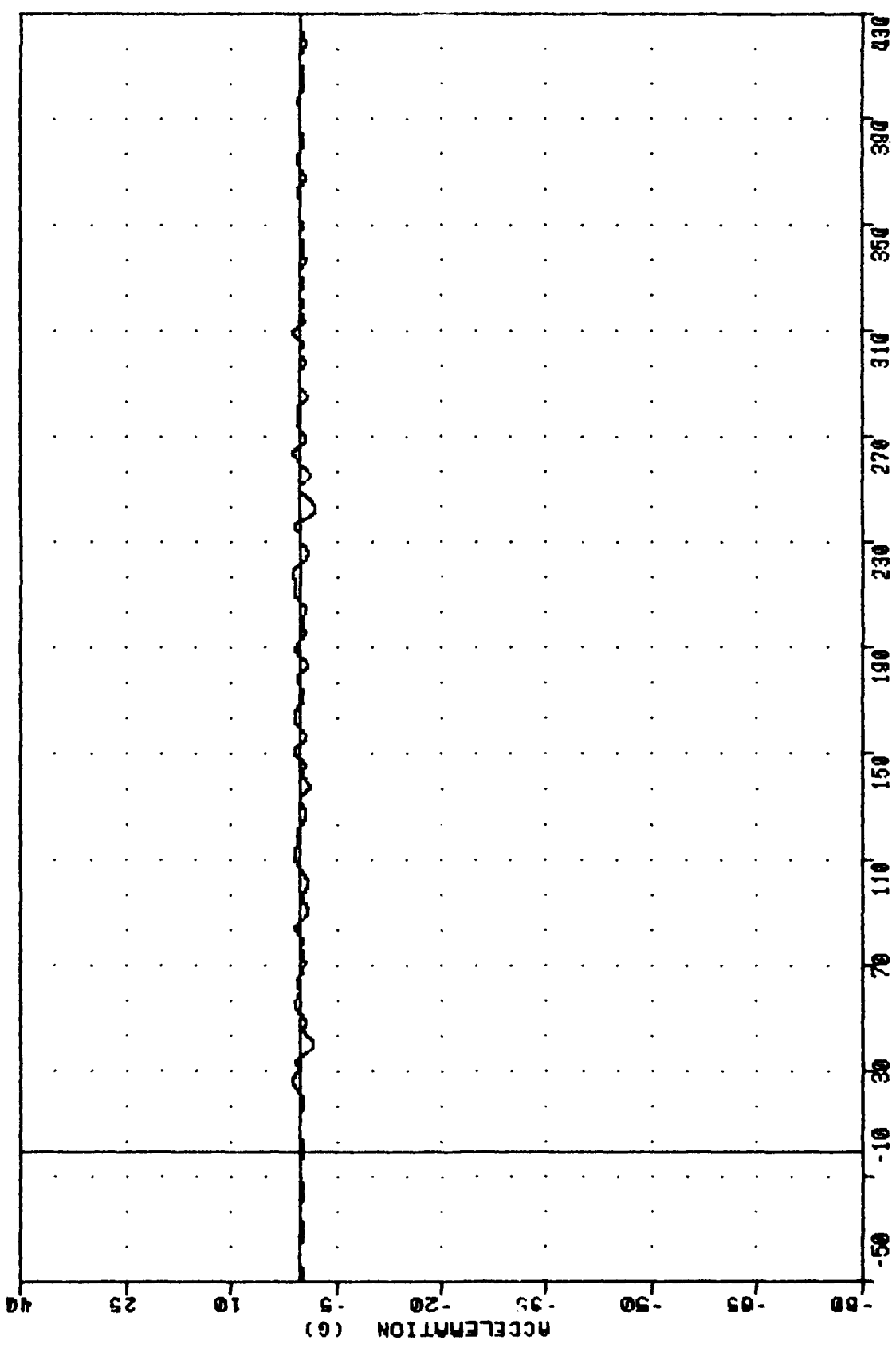
OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 FUSELAGE MID TOP VERTICAL ACCELERATION

FAA . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 91025 FILTER - BLPF 100/ 316/ -40
 FMSX6 MIN, MAX VALUES : -14.88e 90.75, 2.54 e 278.50



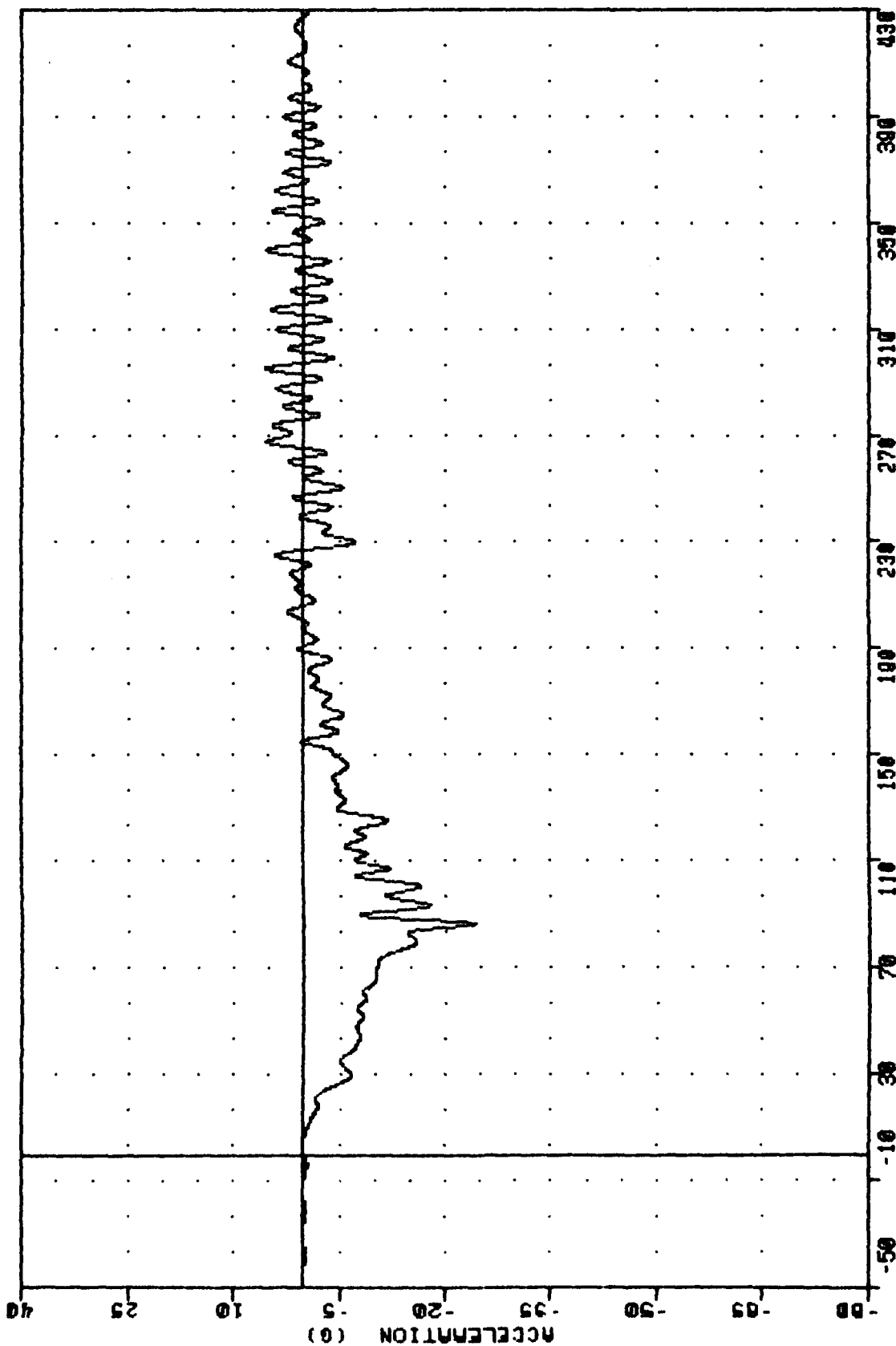
TIME (MSEC)
 OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 FUSELAGE MID STARBOARD LONGITUDINAL ACCELERATION

FAR 91025 FMS76
 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FILTER = 0LPF 100/ 316/ -40
 MIN. MAX VALUES = -2.00e 242.25, 1.33 e 218.58



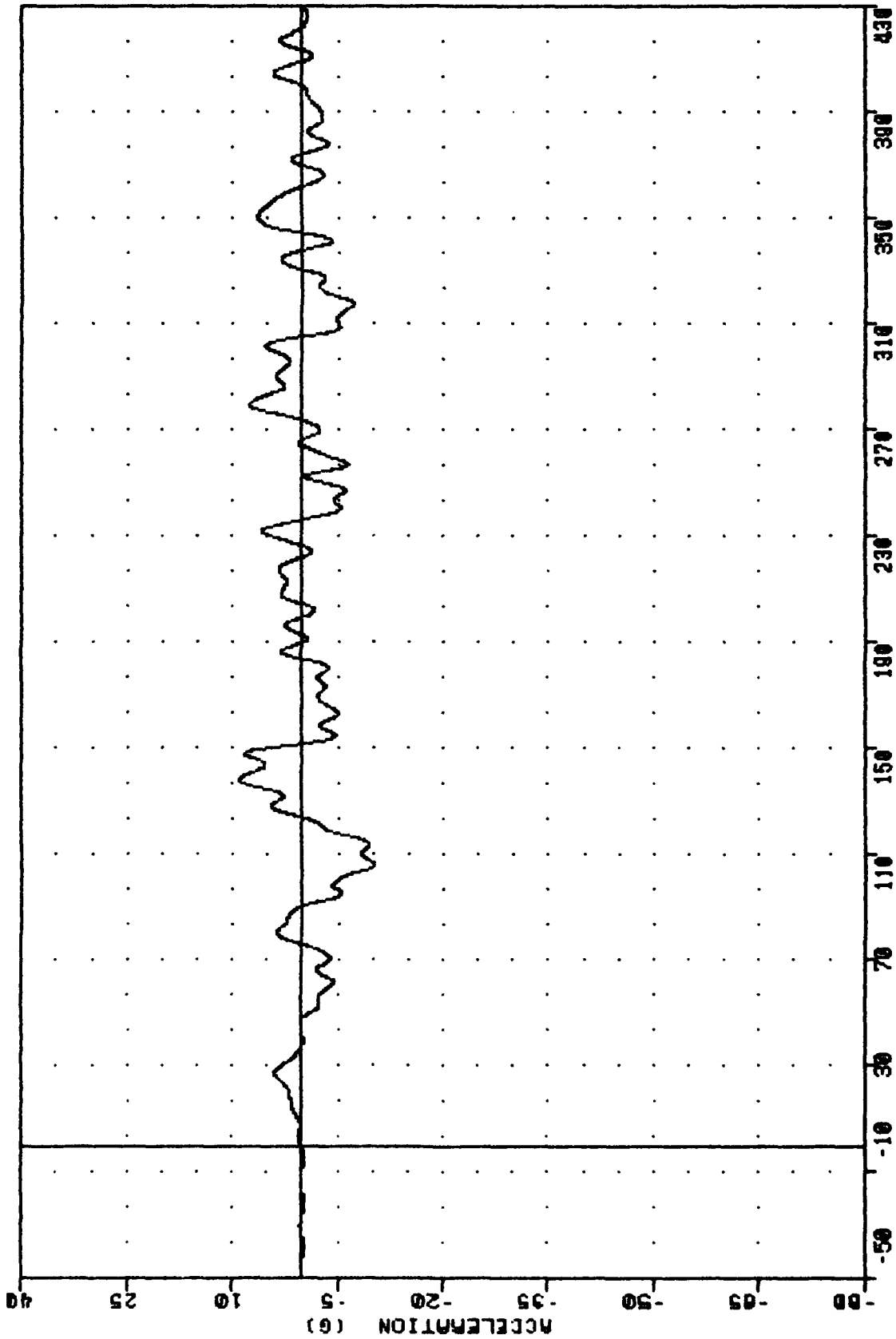
OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 FUSELAGE MID STARBOARD VERTICAL ACCELERATION

FRA . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 91025 FILTER - BLPF 100/ 316/ -40
 FATX6 MIN. MAX VALUES : -24.15 86.63 , 3.39 340.00



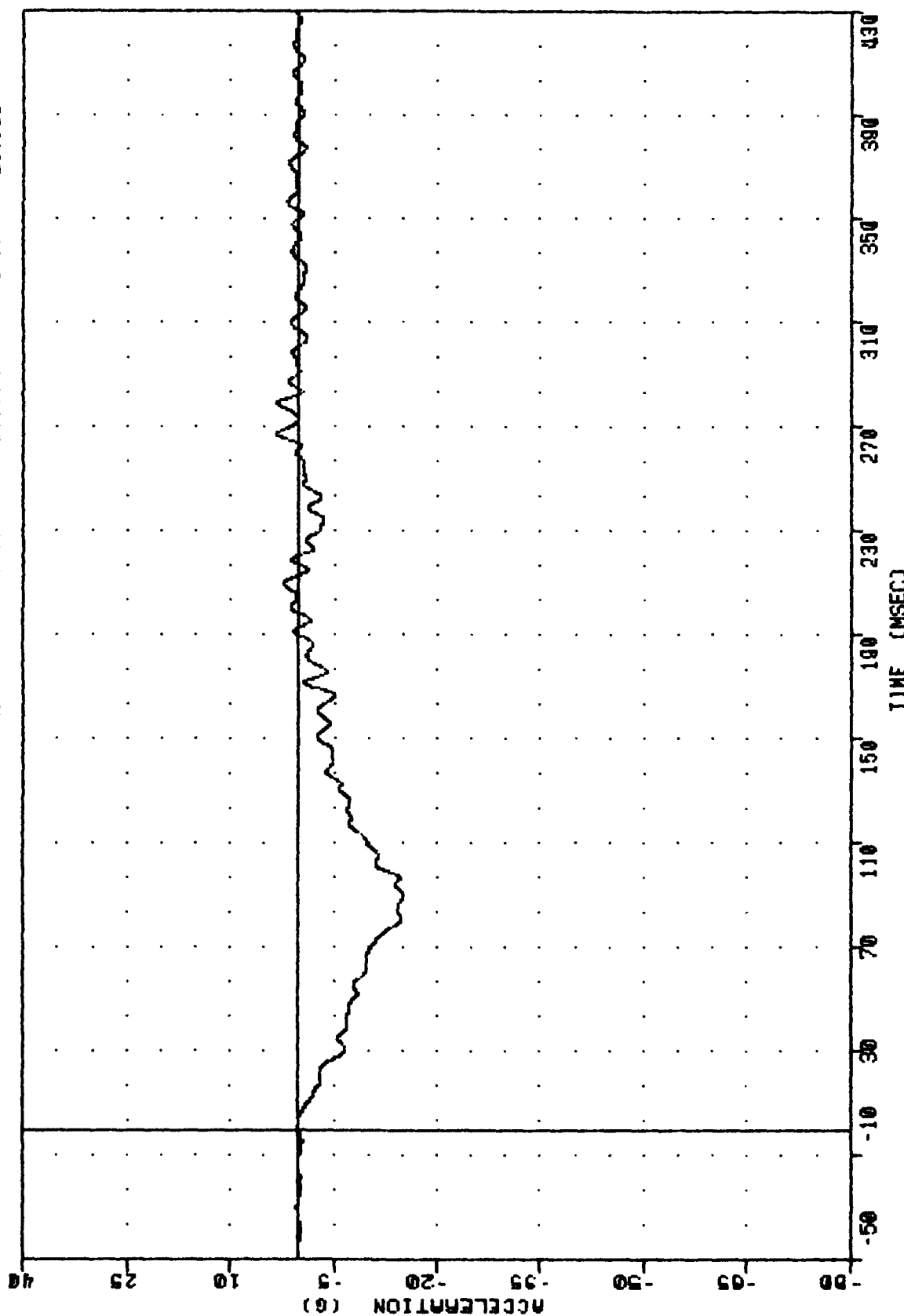
TIME (MSEC)
 OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 FUSELAGE AFT TOP LONGITUDINAL ACCELERATION

FRA 91025 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FAT26 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -10.23g 106.00, 8.96 g 138.00



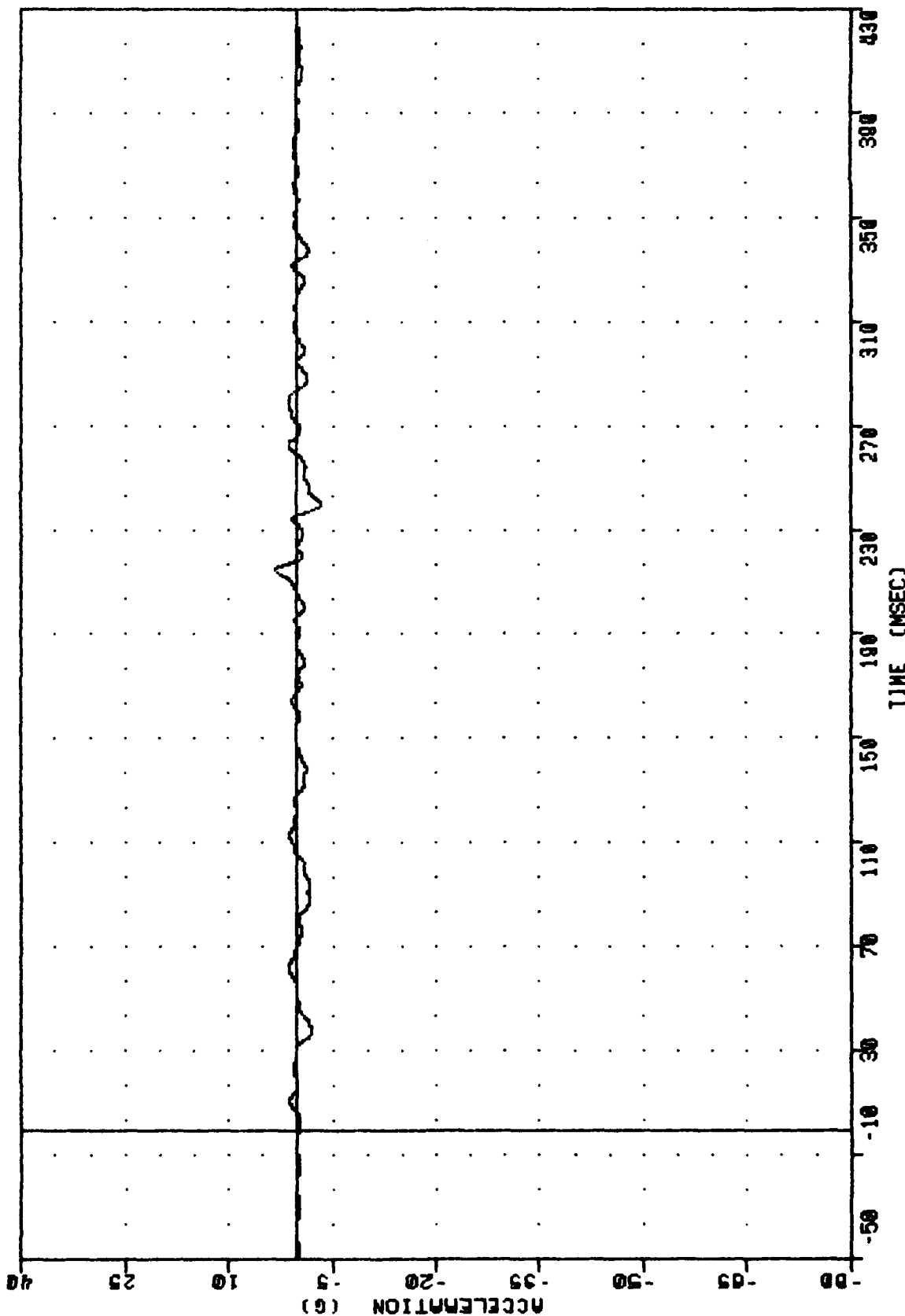
TIME (MSEC)
 OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 FUSELAGE AFT TOP VERTICAL ACCELERATION

FAH . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 91025 FILTER - BLPF 100/ 316/ -40
 FASX6 MIN, MAX VALUES : -15.02g 89.50 , 3.35 g 267.15



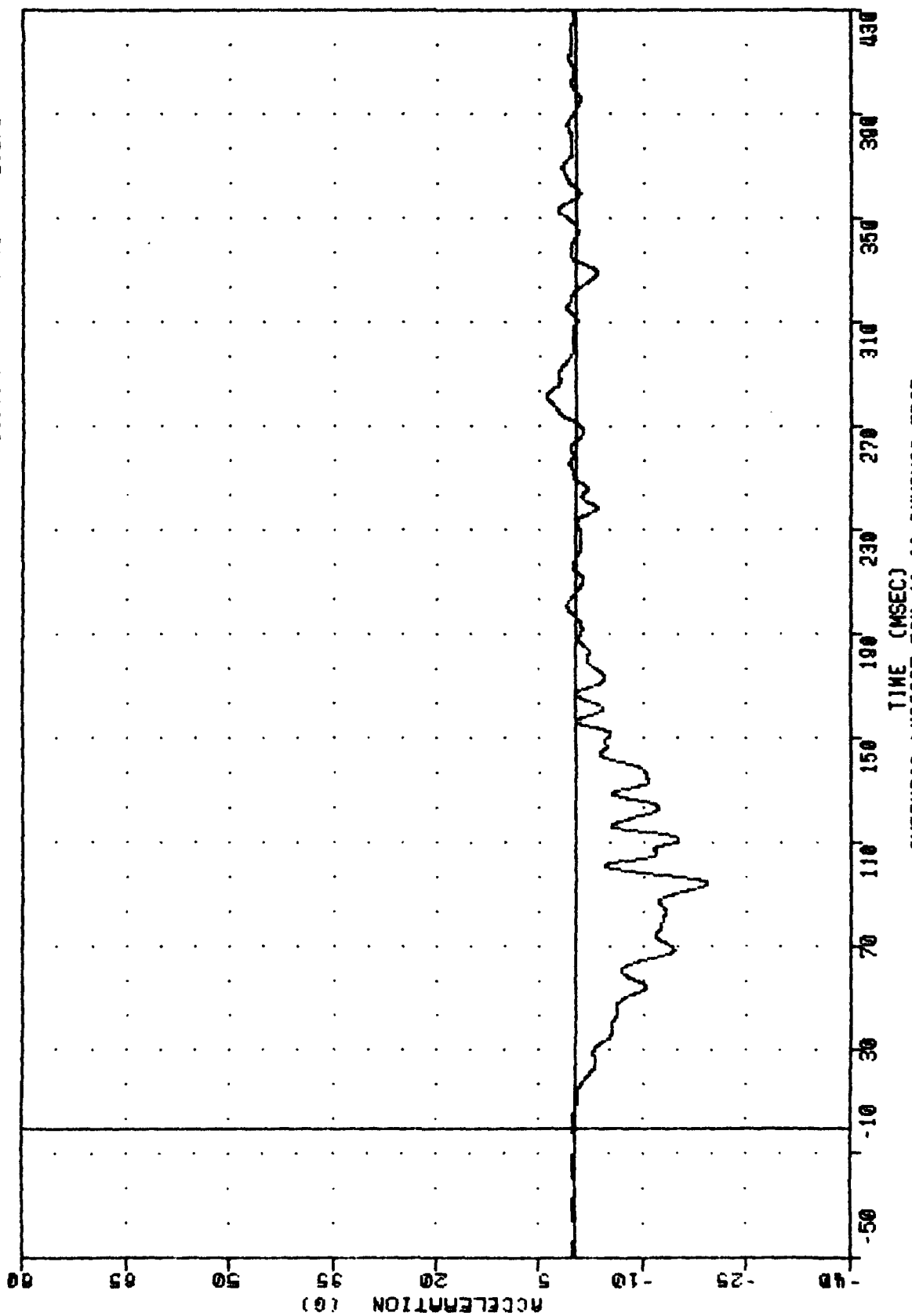
OVERHEAD LUGGAGE BIN 13.2g DYNAMIC TEST
 FUSELAGE AFT STABBOARD LONGITUDINAL ACCELERATION

FAR 91025
 FAR376
 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -3.400 240.25, 9.27 214.75

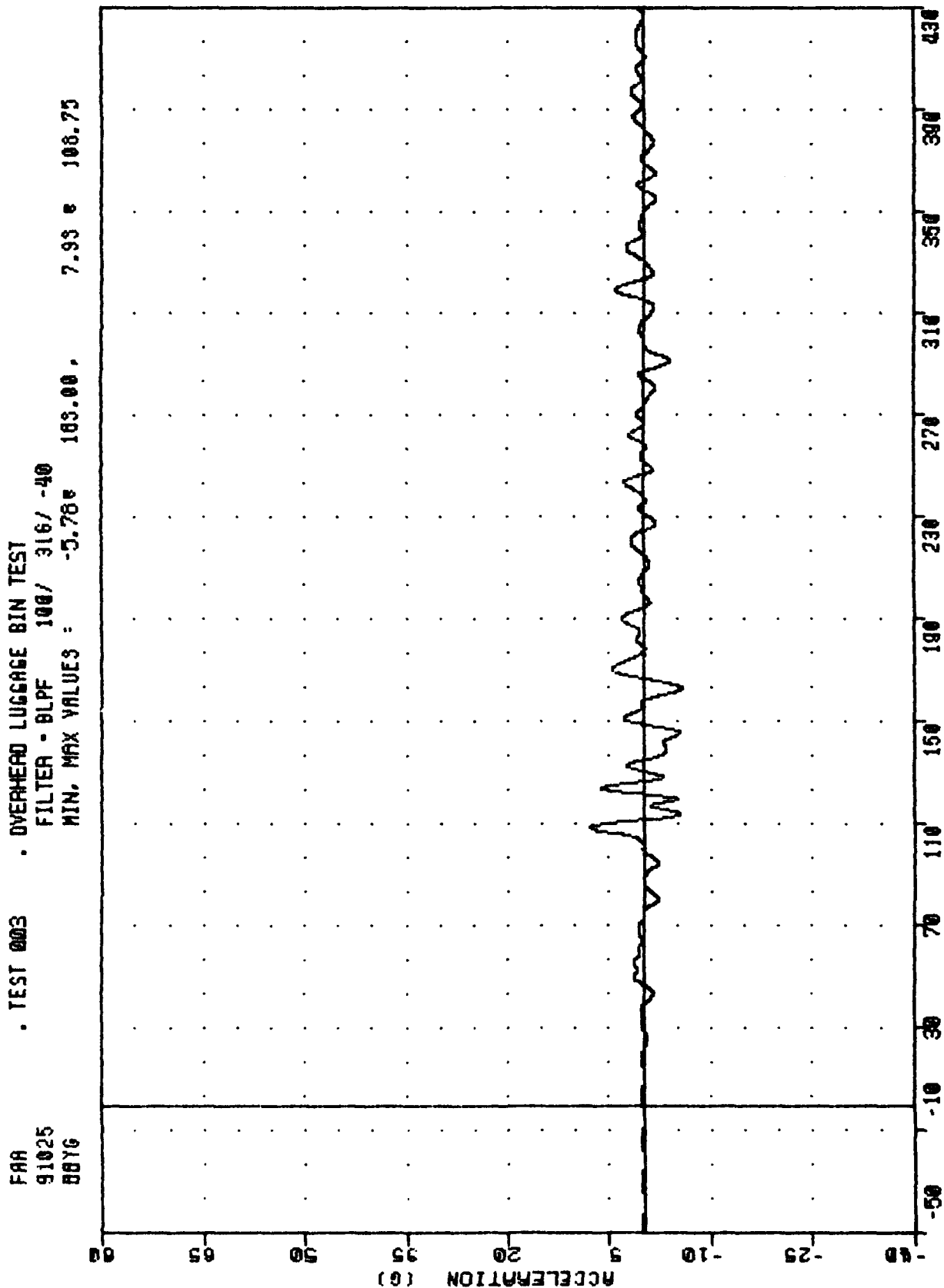


OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 FUSELAGE AFT STARBOARD VERTICAL ACCELERATION

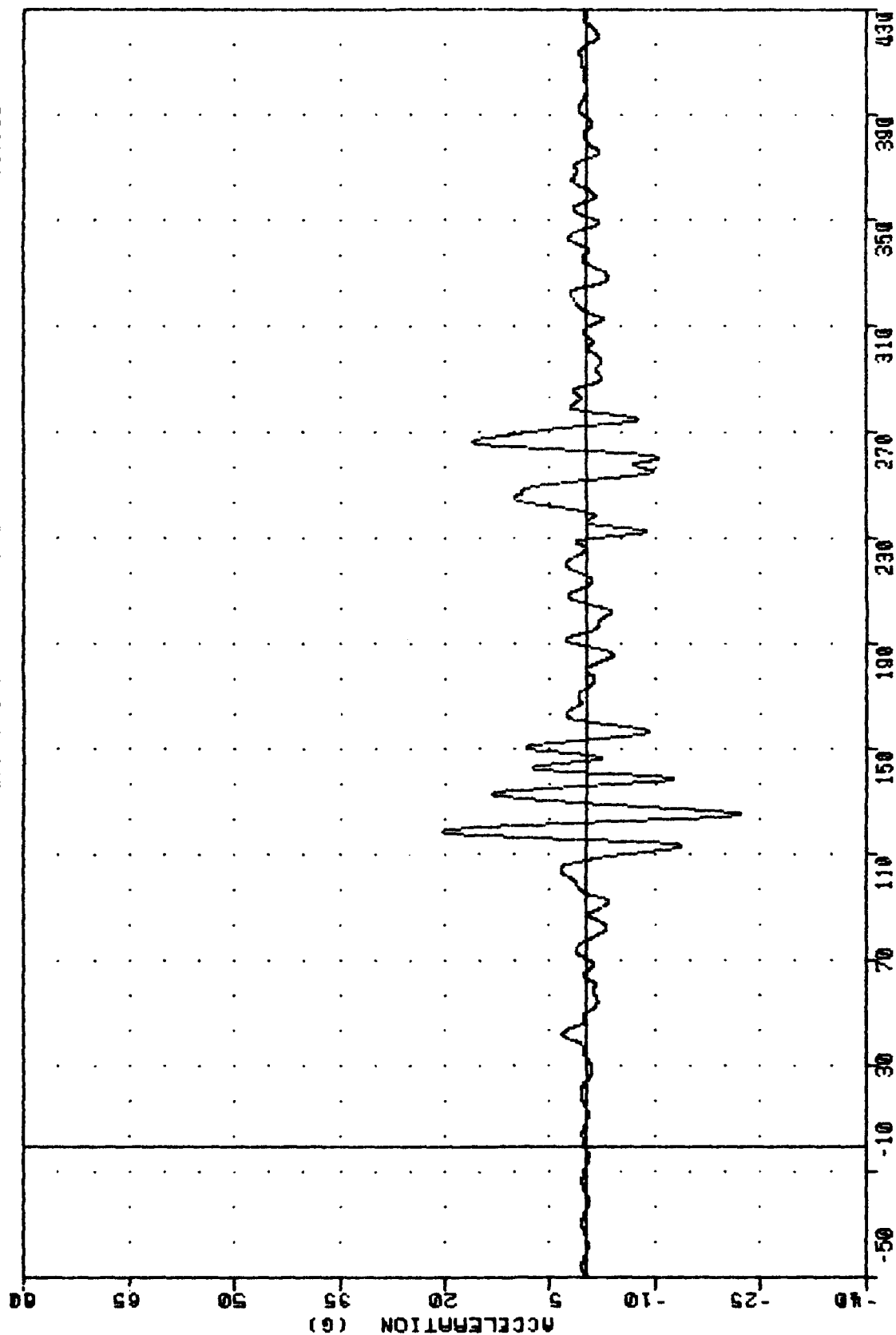
FAR 91025
 88X6
 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES : -19.40 94.50 . 4.16 282.00



OVERHEAD LUGGAGE BIN 13.2G DYNAMIC TEST
 BIN B LONGITUDINAL ACCELERATION

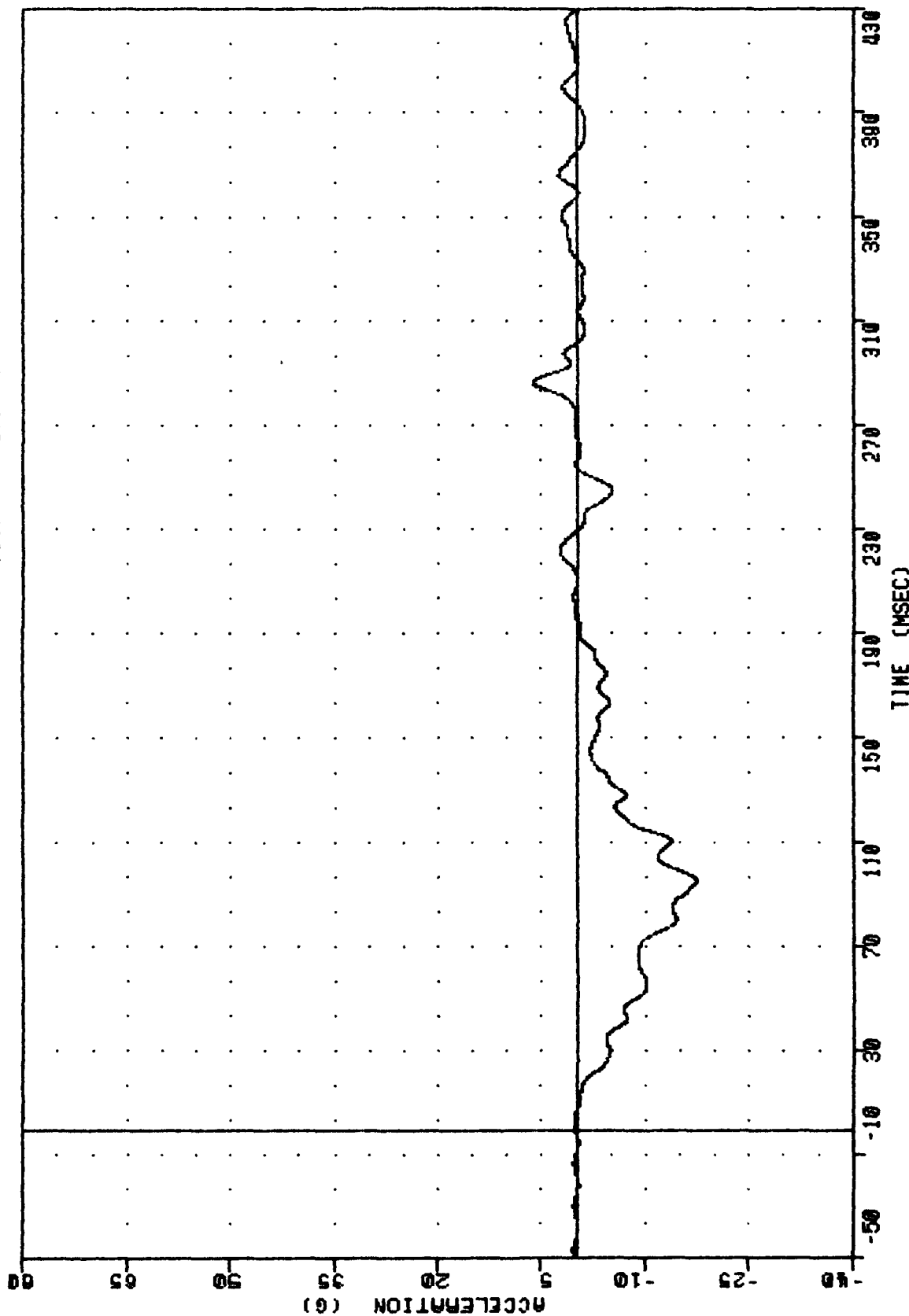


FRA 91025 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 0026 FILTER - 8LPF 100/ 316/ -40
 MIN. MAX VALUES : -22.10 125.50 20.42 119.00



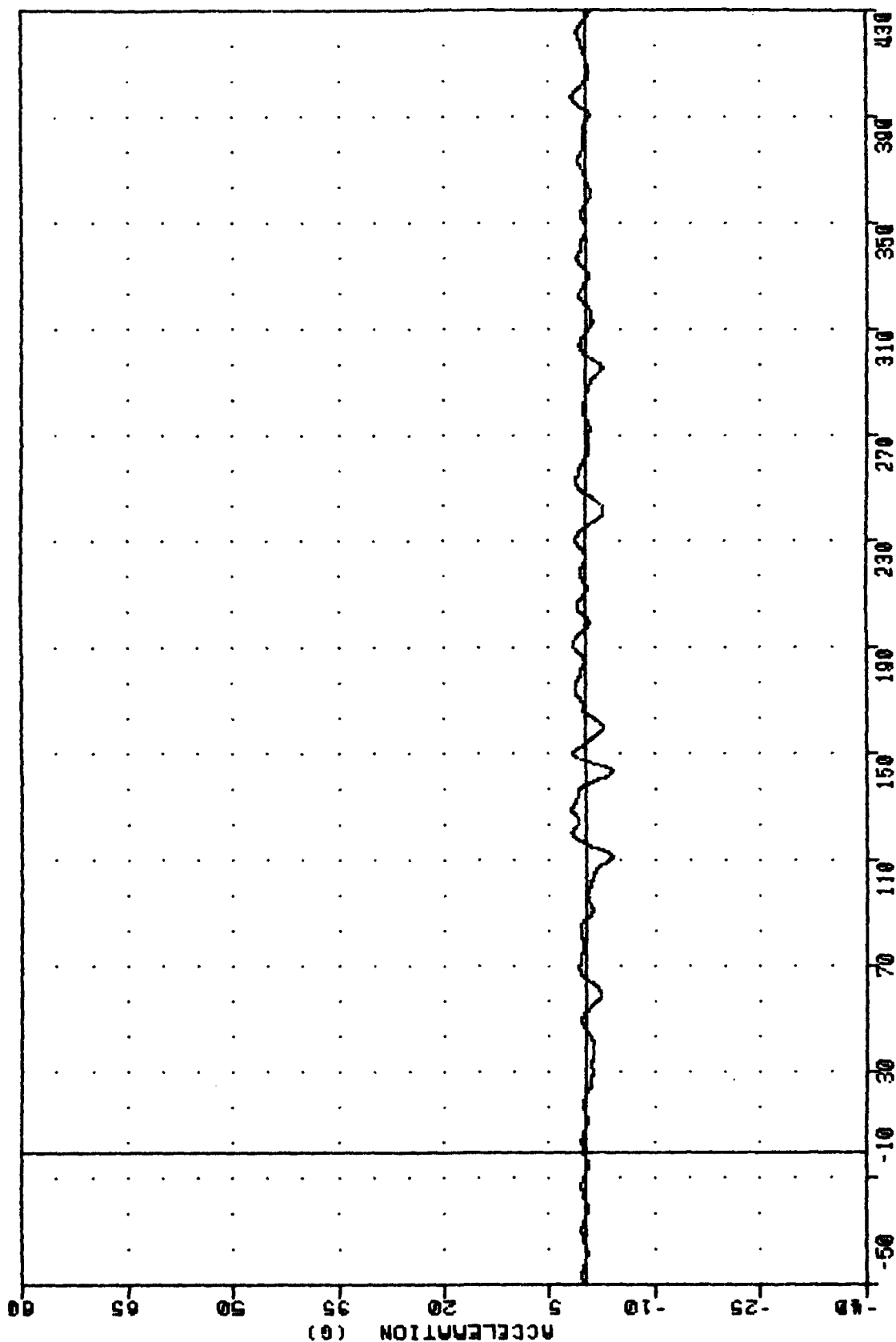
OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 BIN B VERTICAL ACCELERATION

FRA 91025
 HBX6
 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN. MAX VALUES = -17.41e 95.50 . 8.21 e 286.75



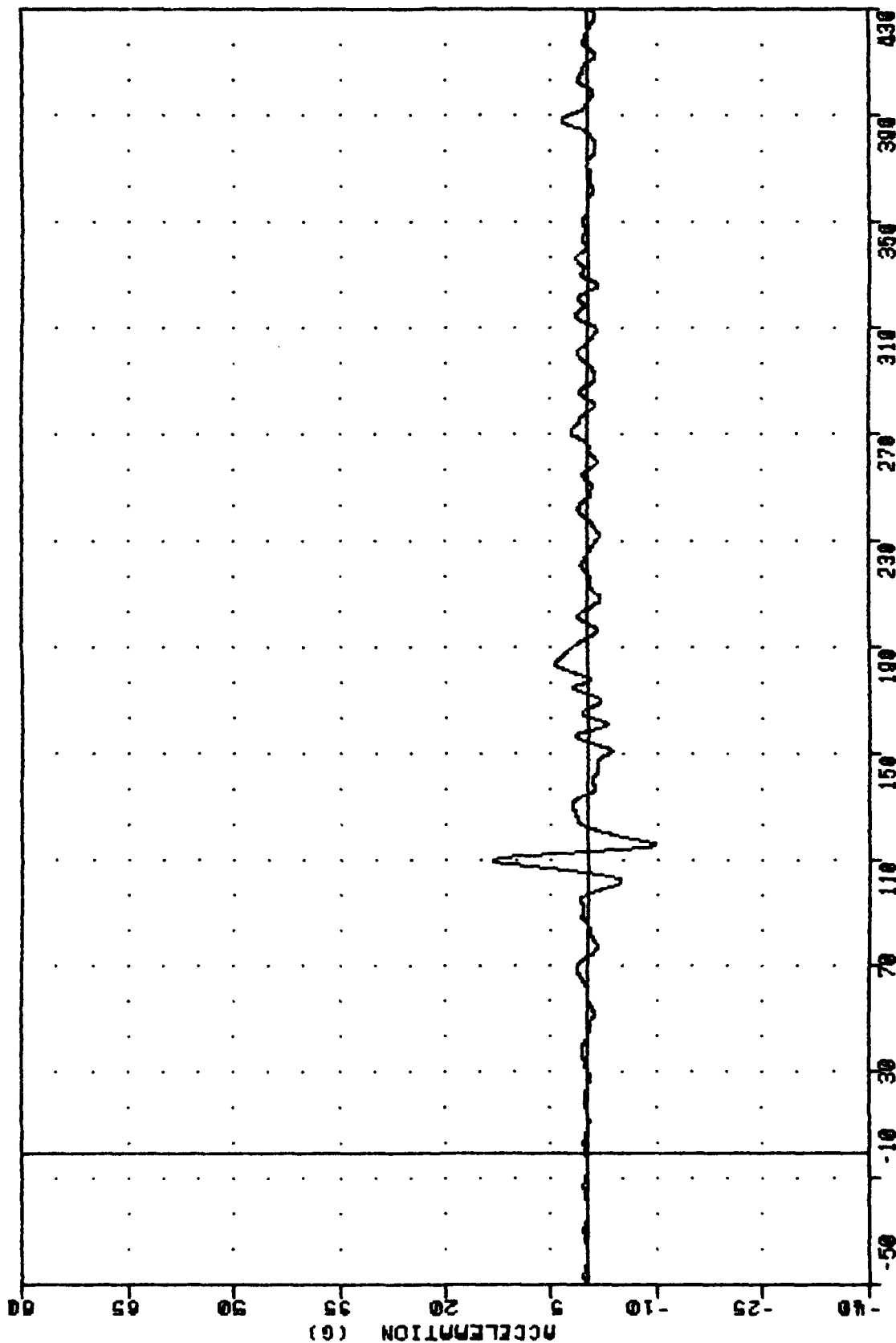
TIME (MSEC)
 OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 BIN A LONGITUDINAL ACCELERATION

FRA 91025 HBYG
 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES : -3.93 143.36 , 1.63 129.23



OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 BIN A LATERAL ACCELERATION

FAA
 91025
 H026
 . TEST 003 . OVERHEAD LUGGAGE BIN TEST
 FILTER - BLPF 100/ 316/ -40
 MIN, MAX VALUES = -9.57g 110.13, 13.41 g 110.80



TIME (MSEC)
 OVERHEAD LUGGAGE BIN 13.26 DYNAMIC TEST
 BIN A VERTICAL ACCELERATION

APPENDIX C

CALIBRATION DATA

LIST OF ILLUSTRATIONS

FIGURE	DESCRIPTION	PAGE
C-1.	BIN 'B' INSTRUMENTATION LOCATIONS, TEST OHBC-01	C-10
C-2.	BIN 'B' INSTRUMENTATION LOCATIONS, TEST OHBC-02	C-11
C-3.	BIN 'A' INSTRUMENTATION LOCATIONS, TEST OHBC-03	C-12
C-4.	FRONT VIEW OF FUSELAGE AND STATIC TEST FIXTURE, TEST OHBC-01	C-13
C-5.	SIDE VIEW BIN 'B' PULL SETUP AND LINEAR POTENTIOMETER POSITIONS	C-13
C-6.	REAR VIEW BIN 'B' PULL SETUP AND LINEAR POTENTIOMETER POSITIONS	C-14
C-7.	BIN 'B' LINKS 1 AND 2	C-14
C-8.	BIN 'B' LINK 3	C-15
C-9.	BIN 'B' LINK 4	C-15
C-10.	BIN 'B' LINKS 5 AND 6	C-16
C-11.	BIN 'B' LINKS 13, 21, AND 29	C-16
C-12.	BIN 'B' LINKS 14 AND 22	C-17
C-13.	BIN 'B' LINK 32	C-17
C-14.	BIN 'B' LINKS 15, 16, 23, 24, AND 30	C-18
C-15.	POST-TEST OHBC-01 DAMAGE, 60" BIN FORWARD PANEL	C-18
C-16.	FRONT VIEW OF FUSELAGE AND STATIC TEST FIXTURE, TEST OHBC-02	C-19
C-17.	PRE-TEST OHBC-02, BIN 'B' LINK 30 DETACHED	C-19
C-18.	PRE-TEST OHBC-02, BIN 'B' LINK 32 ATTACHED	C-20
C-19.	PRE-TEST OHBC-02, BIN 'B' LINK 29 DETACHED	C-20
C-20.	PRE-TEST OHBC-02, BIN 'B' INBOARD DEFLECTION INDICATOR BETWEEN THE 60" BIN AND REAR 20" BIN	C-21
C-21.	POST-TEST OHBC-02, BIN 'B' INBOARD DEFLECTION INDICATOR BETWEEN THE 60" BIN AND REAR 20" BIN	C-21
C-22.	PRE-TEST OHBC-02, BIN 'B' OUTBOARD DEFLECTION INDICATOR BETWEEN THE 60" BIN AND REAR 20" BIN	C-22
C-23.	POST-TEST OHBC-02 BIN 'B' OUTBOARD DEFLECTION INDICATOR BETWEEN THE 60" BIN AND REAR 20" BIN	C-22
C-24.	FRONT VIEW OF FUSELAGE AND STATIC TEST FIXTURE, TEST OHBC-03	C-23
C-25.	ANGLE VIEW OF FUSELAGE AND STATIC TEST FIXTURE, TEST OHBC-03	C-23
C-26.	BIN 'A' LINKS 3, 4, AND 14 LOCATIONS	C-24
C-27.	BIN 'A' LINKS 5 AND 7	C-24
C-28.	SIDE VIEW BIN 'A' PULL SETUP	C-25

TABLE C-1

INSTRUMENTATION ACCELEROMETERS INFORMATION

CHANNEL ABBREV.	INSTRUMENT MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	SENSITIVITY	CALIBRATION DATE
FLFXG	ENDEVCO	7264	CW11H	.2892 mv/g	12/07/90
FLFYG	ENDEVCO	7264	CE16H	.2987 mv/g	12/07/90
FLFZG	ENDEVCO	7264	CM27H	.3896 mv/g	12/06/90
FLAXG	ENDEVCO	7264	CJ34H	.3332 mv/g	12/07/90
FLAYG	ENDEVCO	7264	CL60H	.3871 mv/g	12/10/90
FLAZG	ENDEVCO	7264	CW82H	.2359 mv/g	12/07/90
FMTXG	ENDEVCO	7264	CJ62H	.3033 mv/g	12/11/90
FMTZG	ENDEVCO	7264	CB07H	.3469 mv/g	12/11/90
FMSXG	ENDEVCO	2264	CL04H	.4143 mv/g	12/11/90
FMSZG	ENDEVCO	7264	CK32H	.3658 mv/g	12/11/90
FATXG	ENDEVCO	7264	CD74H	.3325 mv/g	12/03/90
FATZG	ENDEVCO	7264	CL55H	.3369 mv/g	12/11/90
FASXG	ENDEVCO	7264	CN95H	.3780 mv/g	12/10/90
FASZG	ENDEVCO	7264	CH28H	.3091 mv/g	12/10/90
BBXG	ENDEVCO	7264	CK11H	.3046 mv/g	12/10/90
BBYG	ENDEVCO	7264	CJ13H	.2924 mv/g	01/17/91
BBZG	ENDEVCO	7264	CR68H	.2774 mv/g	01/17/91
HBXG	ENDEVCO	7264	BW77J	.3245 mv/g	01/16/91
HBYG	ENDEVCO	7264	CY12H	.2295 mv/g	01/16/91
HBZG	ENDEVCO	7264	CG67H	.3054 mv/g	01/16/91
SLDXG	ENDEVCO	7232C	CB51	.2005 mv/g	12/21/90
SLDXGA	ENDEVCO	7231C	CH33	.2046 mv/g	12/21/90

TABLE C-2INSTRUMENTATION INFORMATION CONT'D.
STRAIN GAGES

<u>CHANNEL</u> <u>ABBREV.</u>	<u>DESCRIPTION</u>	<u>SENSITIVITY</u> <u>@ 1000 lbs.</u>
T3HS	LINK 3, BIN A	.354 mv/v
T4HS	LINK 4, BIN A	.2808 mv/v
T5HS	LINK 5, BIN A	.3933 mv/v
T6HS	LINK 6, BIN A	.3952 mv/v
T7HS	LINK 7, BIN A	.38 mv/v
T8HS	LINK 8, BIN A	.241 mv/v
T9HS	LINK 9, BIN A	.3998 mv/v
T10HS	LINK 10, BIN A	.4172 mv/v
T11HS	LINK 11, BIN A	.4238 mv/v
T13HS	LINK 13, BIN A	.427 mv/v
T14HS	LINK 14, BIN A	.759 mv/v
T1BS	LINK 1, BIN B	2.578 mv/v
T2BS	LINK 2, BIN B	2.756 mv/v
T3BS	LINK 3, BIN B	2.741 mv/v
T4BS	LINK 4, BIN B	2.6565 mv/v
T5BS	LINK 5, BIN B	2.643 mv/v
T6BS	LINK 6, BIN B	2.548 mv/v
T7BS	LINK 7, BIN B	2.582 mv/v
T8BS	LINK 8, BIN B	2.58 mv/v
T13BS	LINK 13, BIN B	1.81 mv/v
T14BS	LINK 14, BIN B	1.788 mv/v
T15BS	LINK 15, BIN B	1.741 mv/v
T16BS	LINK 16, BIN B	1.665 mv/v
T17BS	LINK 17, BIN B	1.819 mv/v
T18BS	LINK 18, BIN B	2.255 mv/v
T21BS	LINK 21, BIN B	1.761 mv/v
T22BS	LINK 22, BIN B	1.747 mv/v
T23BS	LINK 23, BIN B	1.733 mv/v
T24BS	LINK 24, BIN B	1.7217 mv/v
T25BS	LINK 25, BIN B	1.766 mv/v
T28BS	LINK 28, BIN B	1.702 mv/v
T30BS	LINK 30, BIN B	2.35 mv/v
T32BS	LINK 32, BIN B	2.2864 mv/v

STATIC PULL TESTS

Three static pull tests were conducted on June 21, 1990. The static tests were used to verify the expected loading on the strain gaged overhead storage bin attachment links. Three tests were conducted as follows:

OHBC-01 - Bin 'B' was pulled on the forward face of the 60-inch bin at a maximum of 1500 pounds. Data was recorded every 250 pounds up to the 1500 pounds peak pull force and every 500 pounds back to 0 pounds pull force. Data was recorded at a total of ten points. The drag links on the forward and rear 20-inch bins were connected.

OHBC-02 - Repeat of test OHBC-01 except the peak load is 1250 pounds instead of 1500 pounds. Data was recorded at nine pull force load points. The drag links on the forward and rear 20-inch bins were disconnected.

OHBC-03 - Bin A was pulled in the same manner as Bin B in Test OHBC-01. Data was recorded at ten pull force loadings, with a peak pull force of 1500 pounds.

SETUP

The fuselage was installed in the test fixture. The test fixture consisted of two sides and the front of the sled test fixture frame. The static pull hardware clamped to the front frame. The pulling hardware included a threaded rod with nut, cable, one load cell, an eye hook bolted to a steel plate, plywood, and foam. An I-beam structure was used to guide and support the pulling hardware and cable. The plywood and foam distributed the load on the front face of the storage bins. The steel plate was placed behind the plywood. The eye hook bolted to the steel plate through a central hole drilled in the plywood, foam, and front of the overhead bins. Cable connects the eye hook, load cell, and threaded rod. The threaded rod passes through a hole in a plate welded to the I-beam structure. Tension in the cable was generated by tightening the nut on the threaded rod. Figures C-4, C-18, C-26, and C-27, show the test fixture setup.

INSTRUMENTATION

Twenty channels of data were recorded for Test OHBC-01, eighteen channels for Test OHBC-02, and nine channels for Test OHBC-03. Tests OHBC-01 and 02 include one load cell to measure pull force and two linear potentiometers to measure deflection of the central bin relative to the forward bin. Test OHBC-03 includes one load cell to measure the pull force. The remaining channels on all three tests are individual link loads from the strain gaged overhead storage bin attachment links. Data from drag links on the forward and rear 20-inch bins were not recorded for Test OHBC-02 because the links were disconnected.

RESULTS

Table C-3 contains the results of the three calibration tests. Following the table of data are figures of the calibration setup and tests. Figures C-1 through C-3 show instrumentation locations. Figures C-4 through C-17 are pre- and post-test photographs of Test OHBC-01. Figures C-18 through C-25 are Test OHBC-02 pre- and post-test photographs. Figures C-26 through C-28 document Test OHBC-03.

The Bin 'B' 60-inch bin forward panel was damaged in Test OHBC-01, as shown in Figure C-17. High density foam was used in Test OHBC-02 against this forward panel to distribute the loading.

TABLE C-3
OVERHEAD STORAGE BIN CALIBRATIONS TEST RESULTS

		TEST OHBC-01									
		TOTAL PULLING FORCE (LBS.)									
CHANNEL	0.00	251.42	486.36	742.27	1011.02	1262.32	1492.86	984.97	504.44	4.08	
OBXD	0.00	-0.00	-0.04	-0.06	-0.10	-0.23	-0.24	-0.24	-0.24	-0.12	
IBXD	0.00	-0.04	-0.11	-0.17	-0.24	-0.55	-0.57	-0.57	-0.50	-0.18	
T1BS	0.00	6.40	6.06	11.05	7.09	3.38	-0.23	-19.23	-5.08	-5.44	
T2BS	0.00	2.25	9.44	14.12	27.80	42.78	52.17	48.74	20.28	1.69	
T3BS	0.00	21.63	49.73	76.38	110.58	150.66	171.41	137.46	73.36	8.63	
T4BS	0.00	-35.20	-84.36	-129.99	-183.80	-243.98	-257.81	-228.26	-138.03	-17.15	
T5BS	0.00	-1.05	-6.22	-11.59	-19.60	-30.28	-42.96	-20.78	-16.83	-6.02	
T6BS	0.00	-4.05	-3.23	-4.80	-4.15	-1.66	-13.18	3.66	14.60	10.63	
T13BS	0.00	1.50	1.62	4.45	7.20	7.04	8.43	2.84	-1.32	-1.86	
T14BS	0.00	-11.82	-32.05	-60.51	-91.39	-116.19	-137.18	-84.82	-33.55	3.10	
T15BS	0.00	-30.79	-56.90	-81.01	-102.44	-127.68	-134.20	-104.68	-56.90	-5.47	
T16BS	0.00	-4.32	-7.13	-11.51	-16.54	-17.95	-38.50	-10.11	-3.96	3.26	
T21BS	0.00	-0.74	-4.03	-7.29	-13.38	-15.60	-19.70	-15.17	-4.05	2.24	
T22BS	0.00	10.22	31.44	53.94	77.56	91.77	107.21	78.77	43.03	4.01	
T23BS	0.00	1.24	-6.71	-16.59	-30.33	-24.74	-33.10	-22.61	-16.27	-7.15	
T24BS	0.00	-1.59	-0.80	1.36	5.85	-3.82	-5.21	-4.28	-0.78	1.00	
T29BS	0.30	22.92	53.88	94.00	132.78	143.74	171.39	92.89	18.11	-9.80	
T30BS	0.02	8.63	27.88	53.10	80.67	94.16	197.50	57.74	2.48	-17.92	
T32BS	0.00	205.01	396.00	590.18	796.39	1026.45	1130.95	862.04	502.64	46.56	

NOTE: OBXD AND IBXD ARE IN INCHES. ALL OTHER CHANNELS ARE IN POUNDS. TENSION IS POSITIVE

TABLE C-3, CONT'D.

OVERHEAD STORAGE BIN CALIBRATIONS TEST RESULTS

		TEST OHBC-02									
		TOTAL PULLING FORCE (LBS.)									
CHANNEL	0.00	257.30	498.68	758.19	1012.09	1267.72	986.32	503.35	5.67		
OBXD	0.00	0.00	-0.04	-0.04	-0.01	0.00	0.00	0.01	0.10		
IBXD	0.00	0.00	-0.08	-0.10	-0.10	-0.10	-0.10	-0.02	0.07		
T1BS	0.00	1.66	0.42	-2.38	-3.72	-6.20	-20.94	-13.94	-10.22		
T2BS	0.00	7.05	15.98	28.52	40.32	53.37	47.96	20.22	1.21		
T3BS	0.00	29.53	60.86	96.21	134.72	164.30	142.16	79.36	11.90		
T4BS	0.00	-52.02	-106.09	-158.08	-217.32	-260.06	-233.20	-138.41	-14.92		
T5BS	0.00	-3.39	-11.18	-22.63	-39.51	-46.92	-38.56	-25.67	-9.52		
T6BS	0.00	2.08	5.38	7.32	17.85	15.50	18.78	18.21	9.53		
T13BS	0.00	-0.35	-1.91	-2.60	-3.07	-1.37	-3.09	-2.28	-1.02		
T14BS	0.00	-8.73	-17.68	-36.16	-62.91	-96.03	-73.76	-29.84	-0.54		
T15BS	0.00	-34.83	-73.85	-118.37	-139.72	-177.31	-138.22	-65.15	-0.42		
T16BS	0.00	-1.65	1.57	6.27	-4.16	-4.16	-3.70	-3.74	0.12		
T21BS	0.00	0.75	1.15	1.22	1.85	0.05	0.90	1.63	1.05		
T22BS	0.00	10.31	21.33	30.25	48.54	56.71	48.54	33.42	4.39		
T23BS	0.00	3.42	10.71	22.09	-3.71	-0.84	-4.06	-8.67	-6.62		
T24BS	0.00	-3.58	-10.23	-18.81	-5.48	-9.53	-6.83	-0.89	1.33		
T32BS	0.00	242.77	485.24	743.83	1002.68	1250.68	1003.07	523.34	19.51		

NOTE: OBXD AND IBXD ARE IN INCHES.

ALL OTHER CHANNELS ARE IN POUNDS.

TENSION IS POSITIVE.

TABLE C-3. CONT'D.

OVERHEAD STORAGE BIN CALIBRATIONS TEST RESULTS

LINK#	TEST OHBC-03									
	TOTAL PULLING FORCE (LBS.)									
	0.00	251.08	499.94	753.25	1005.28	1256.28	1507.28	999.96	508.14	5.27
T3HS	0.00	-44.03	-88.43	-130.61	-172.98	-212.01	-279.52	-192.99	-98.43	14.41
T4HS	-0.01	-15.20	-38.22	-69.92	-103.56	-133.50	-199.05	-131.57	-88.55	-16.56
T5HS	0.00	-4.06	-8.28	-10.17	-11.31	-14.11	-19.65	-5.63	3.76	10.66
T7HS	0.00	26.84	44.52	61.08	77.11	91.29	103.45	78.49	48.96	11.64
T10HS	0.00	2.83	2.06	3.71	8.67	15.60	-24.42	-24.26	-11.90	2.12
T11HS	0.00	3.68	9.09	15.26	22.37	30.50	36.15	30.30	17.91	3.86
T13HS	0.00	0.02	-0.44	-1.63	-3.53	-6.40	-10.19	-5.38	-5.54	-1.67
T14HS	0.03	219.64	431.80	643.72	851.29	1054.88	1375.97	944.85	542.82	2.89

NOTE: ALL CHANNELS ARE IN POUNDS.

TENSION IS POSITIVE.

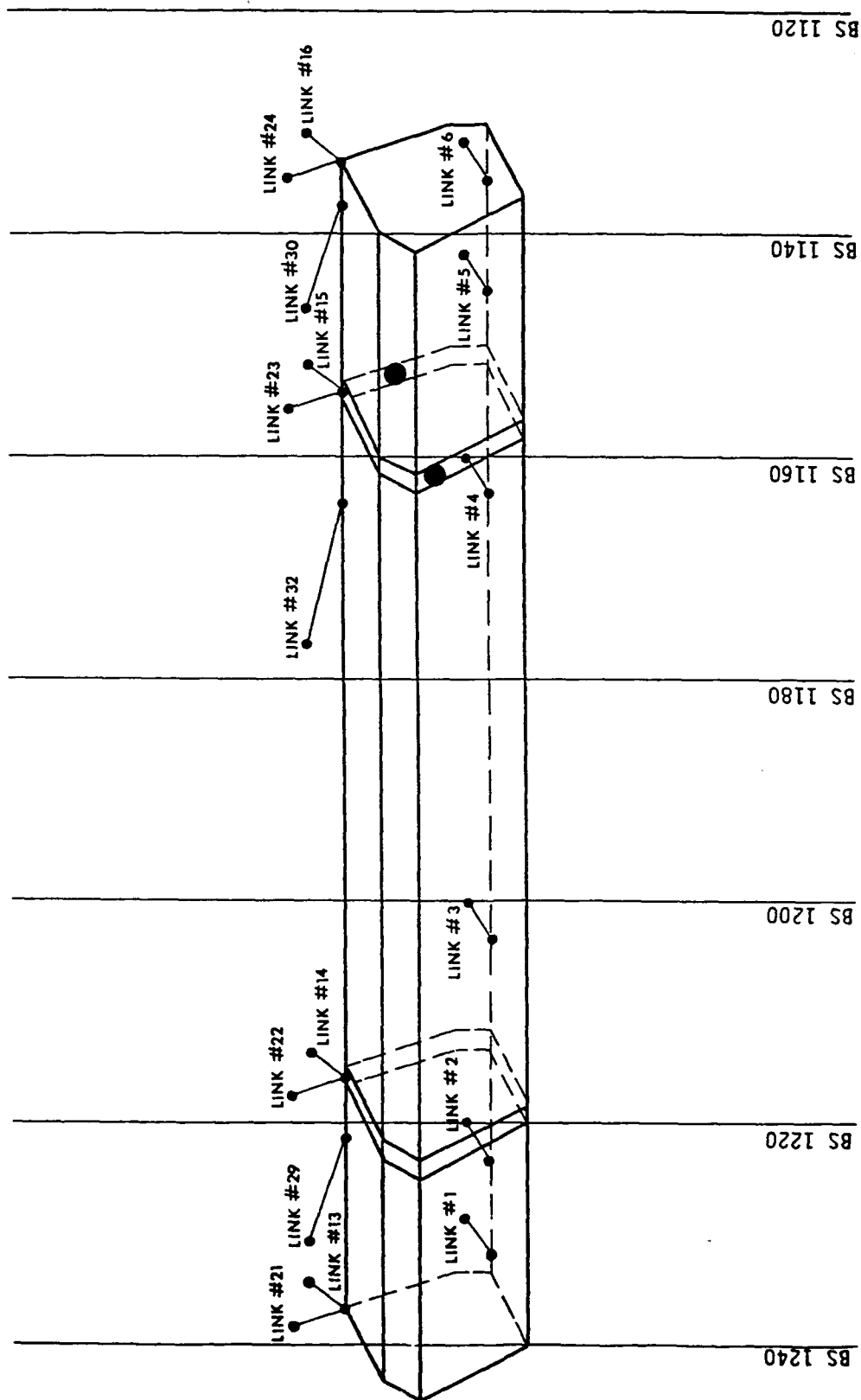
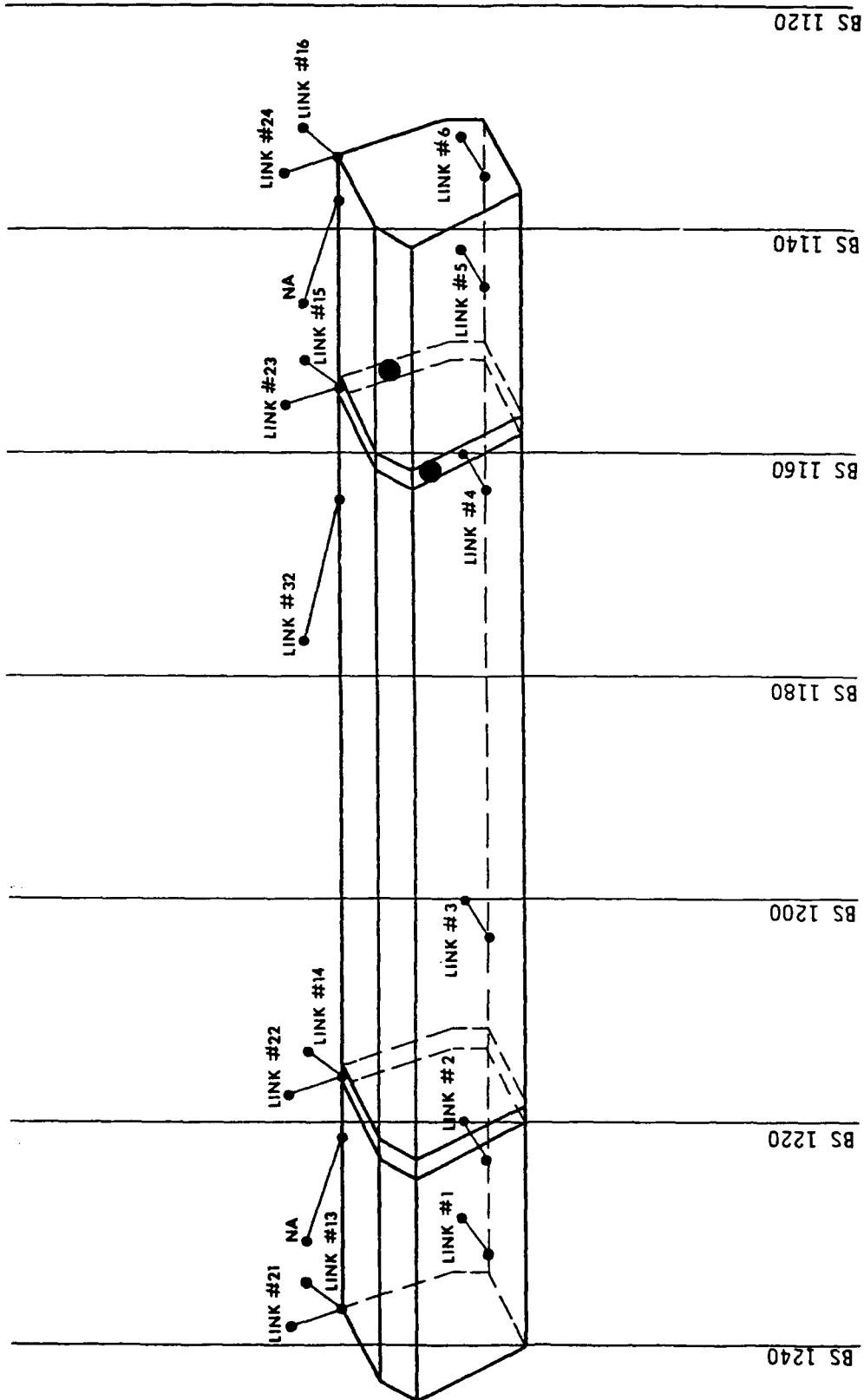
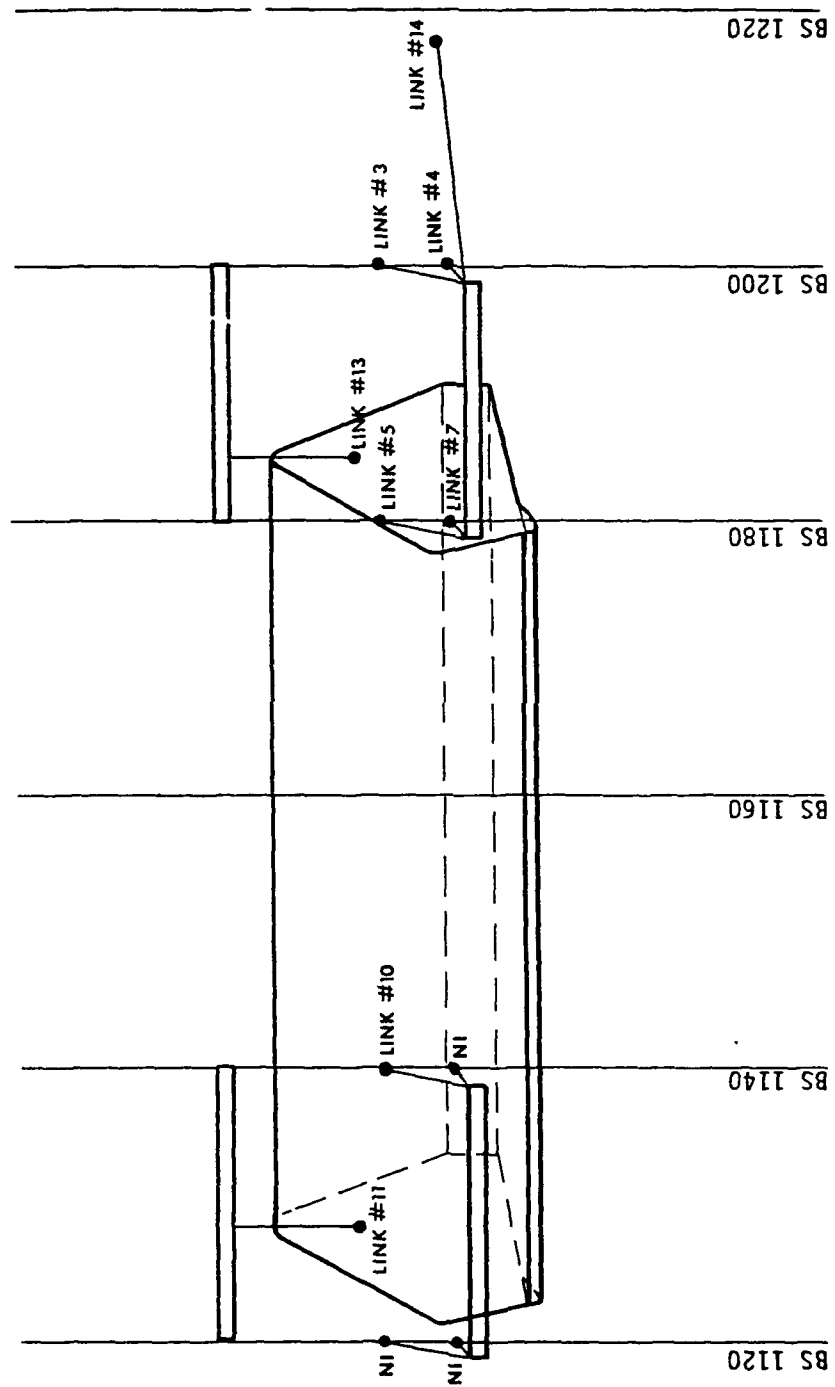


Figure C-1 - BIN B INSTRUMENTATION LOCATIONS
OHBC-01



● LINEAR DISPLACEMENT POT
 NA - LINK NOT ATTACHED TO BIN

Figure C-2 - BIN B INSTRUMENTATION LOCATIONS
 OHBC-02



NI - NON-INSTRUMENTED LINK

Figure C-3 - BIN A INSTRUMENTATION LOCATIONS
OHBC-03

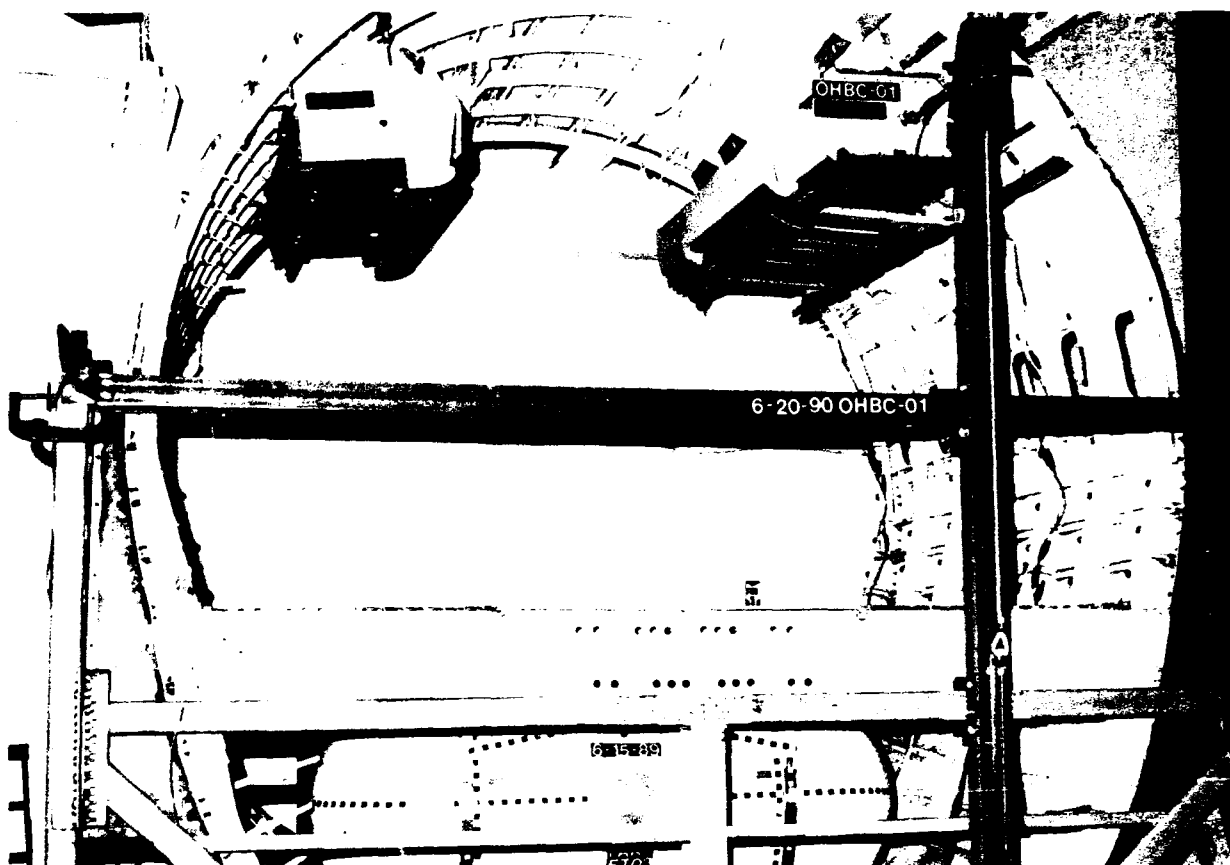


Figure C-4. FRONT VIEW OF FUSELAGE AND STATIC TEST FIXTURE, TEST OHBC-01



Figure C-5. SIDE VIEW BIN 'B' PULL SETUP AND LINEAR POTENTIOMETER POSITIONS
(-1)

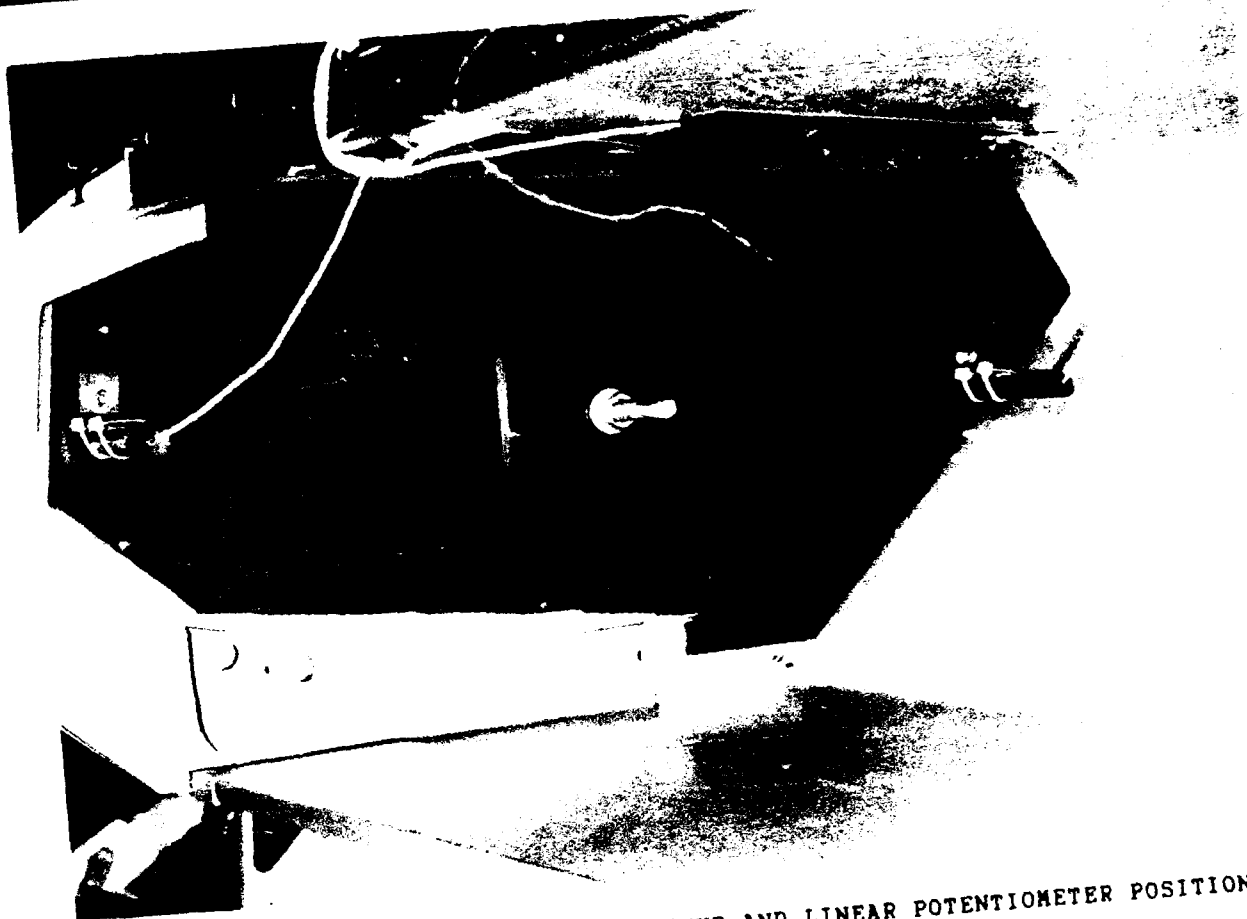


Figure C-6. REAR VIEW BIN 'B' PULL SETUP AND LINEAR POTENTIOMETER POSITIONS

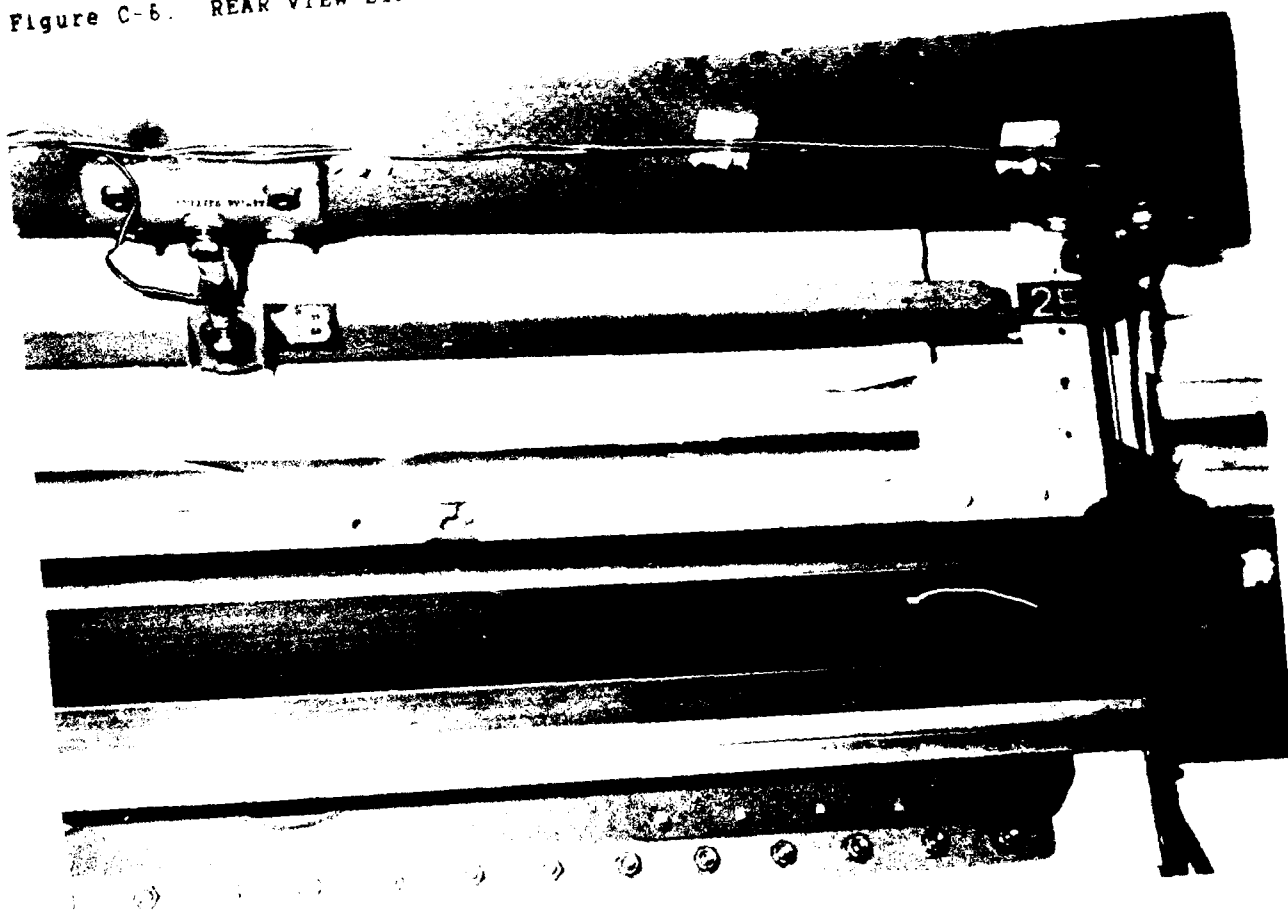


Figure C-7. BIN 'B' LINKS 1 AND 2

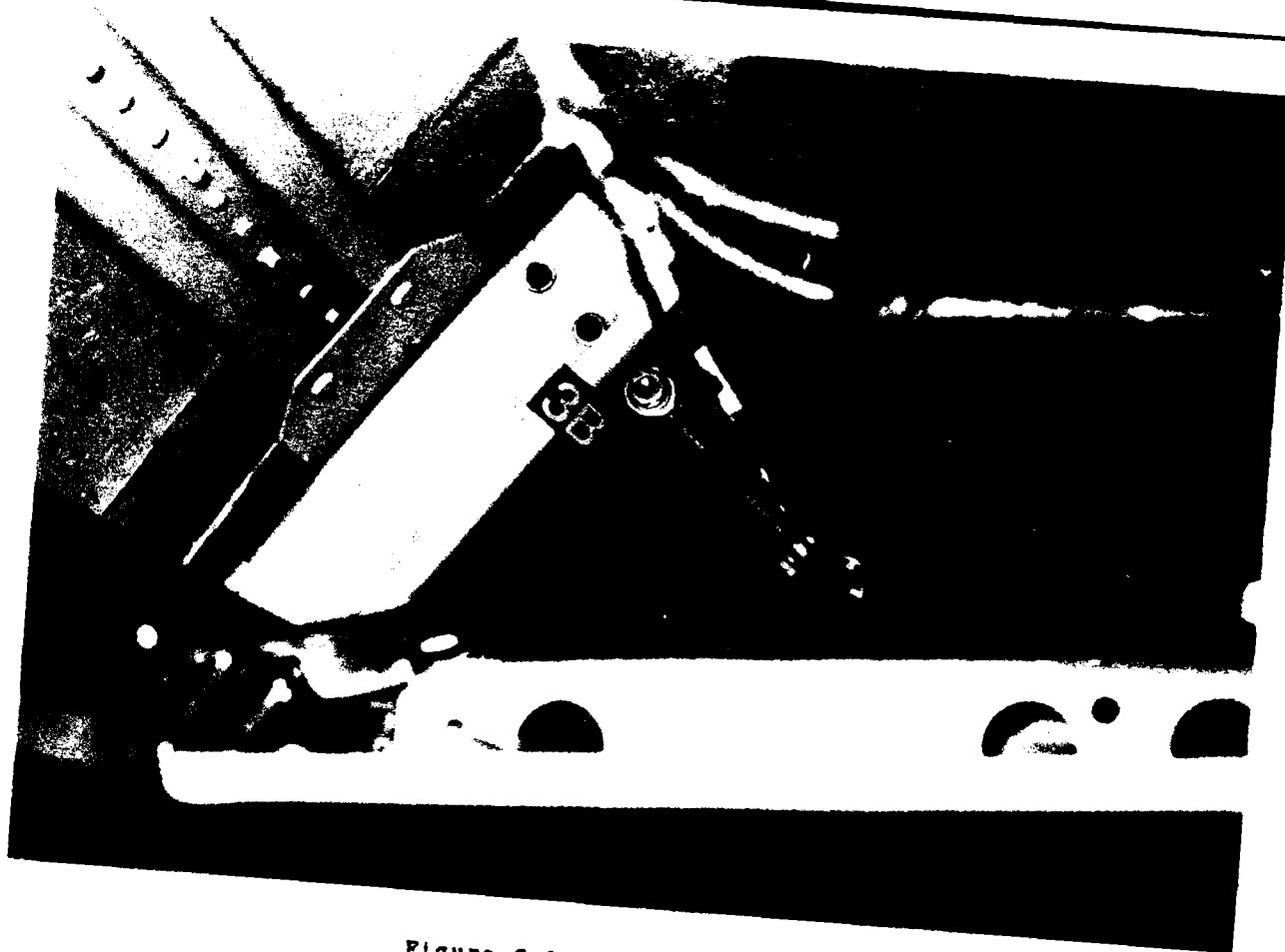


Figure C-8. BIN 'B' LINK 3

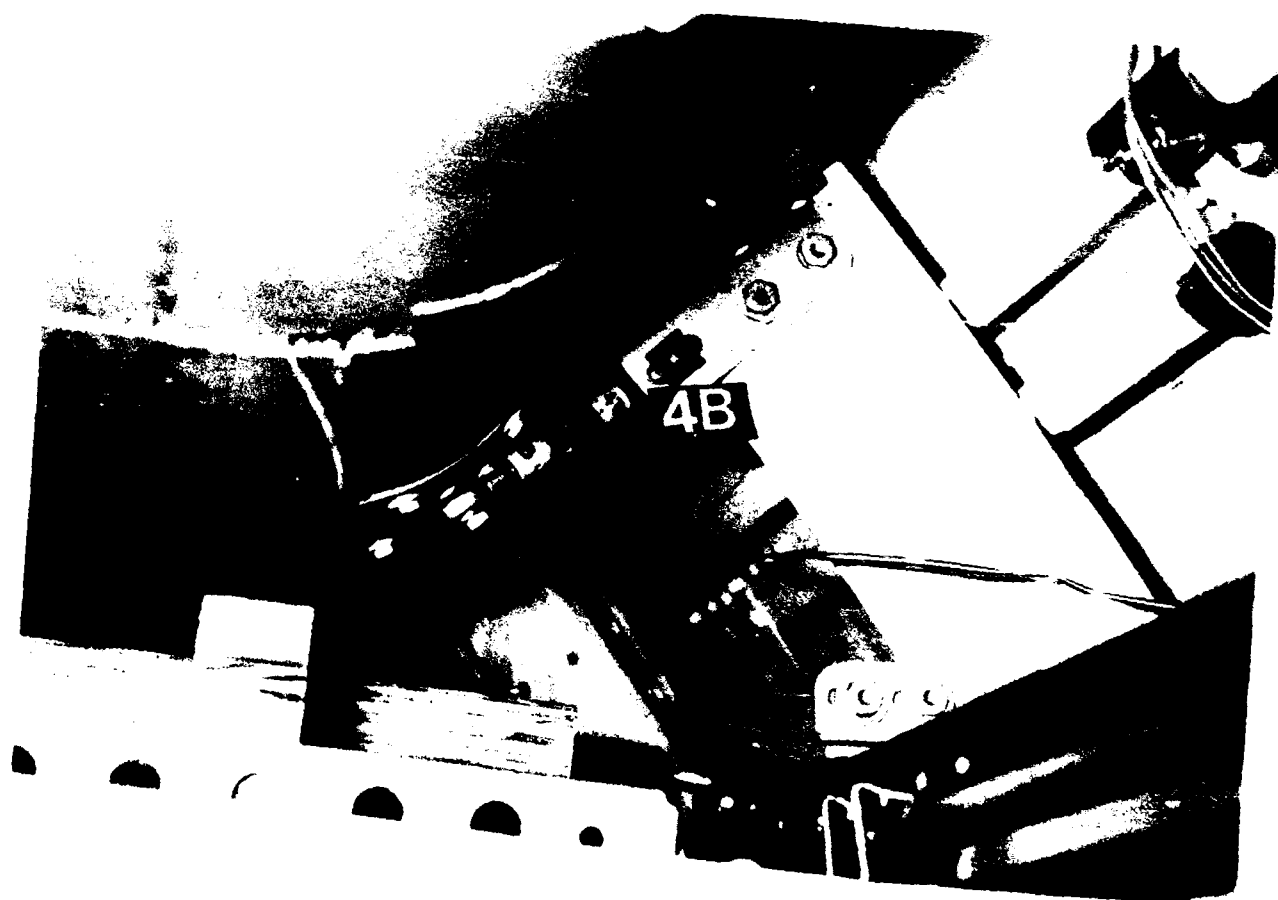


Figure C-9. BIN 'B' LINK 4
C-15

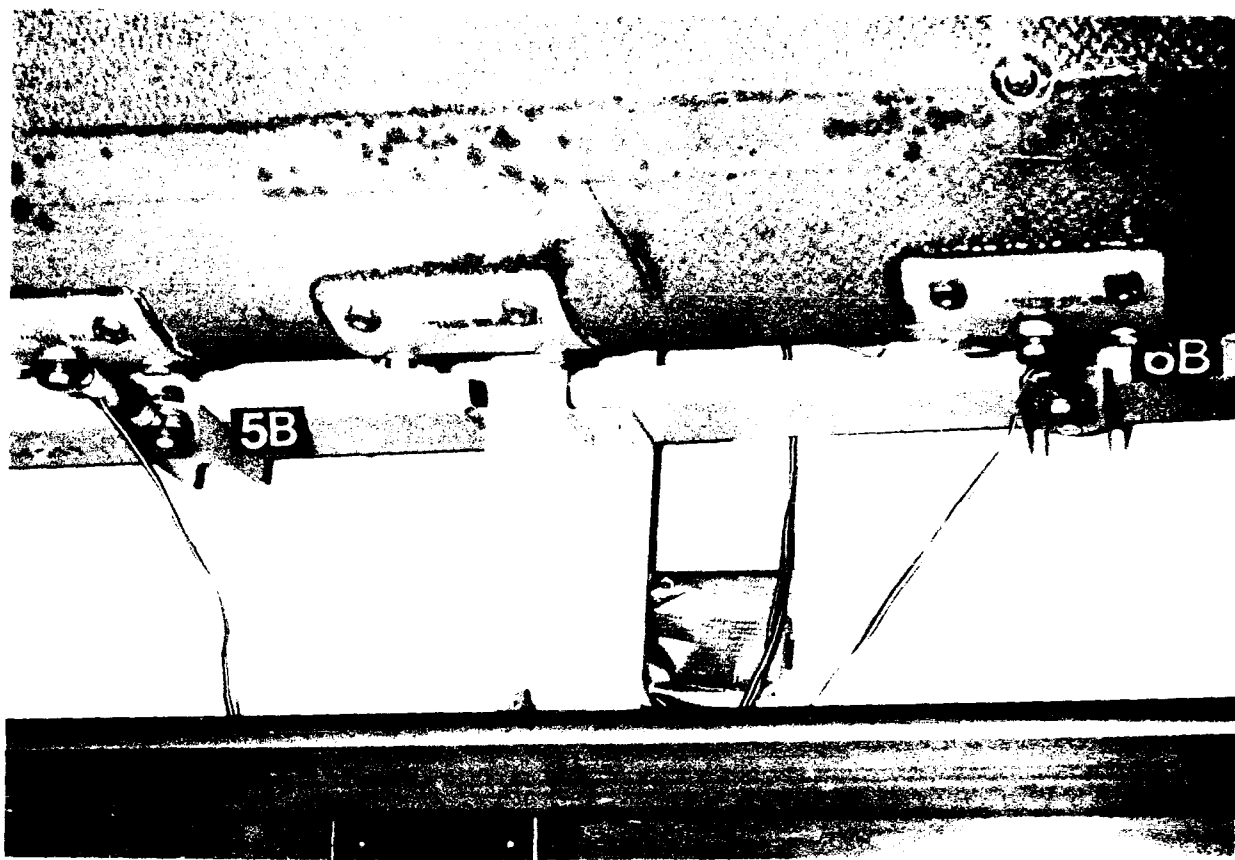


Figure C-10. BIN 'B' LINKS 5 AND 6

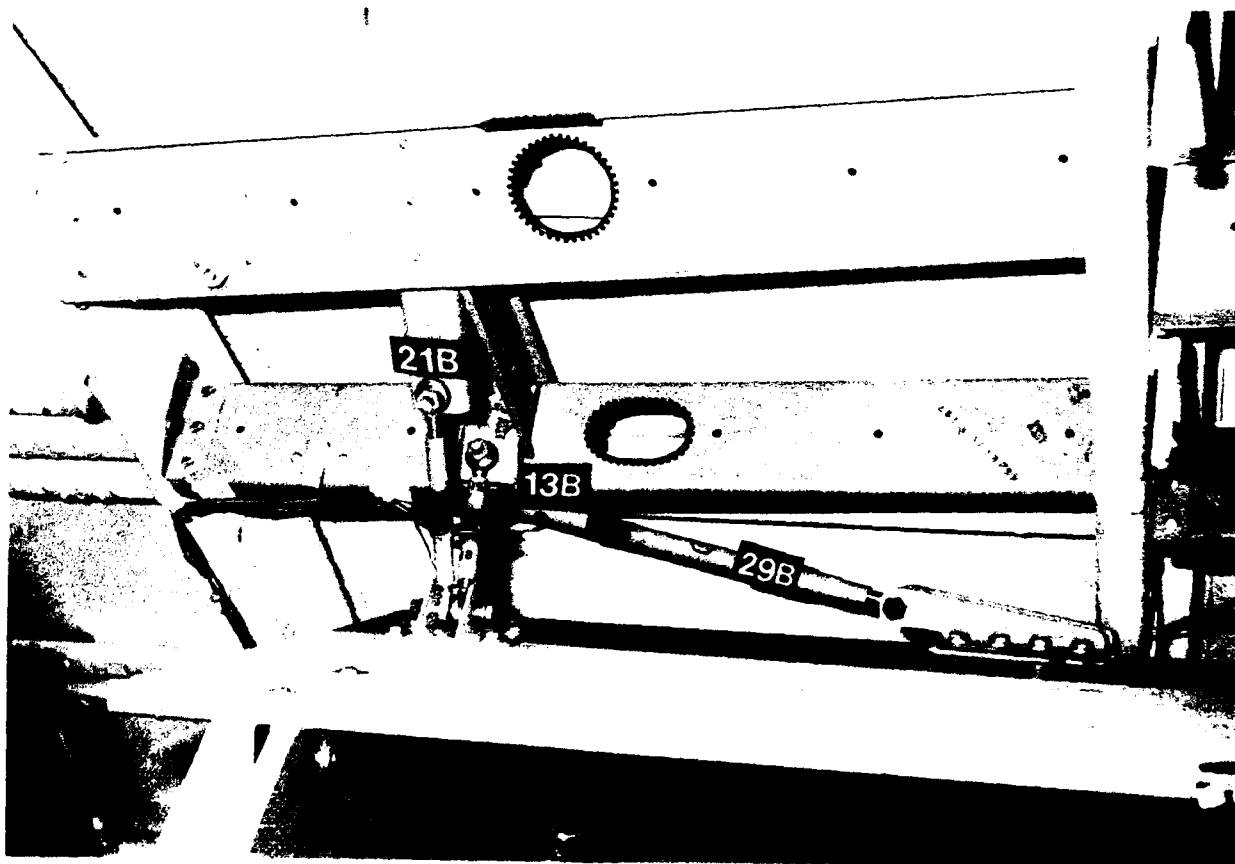


Figure C-11. BIN 'B' LINKS 13, 21, AND 29

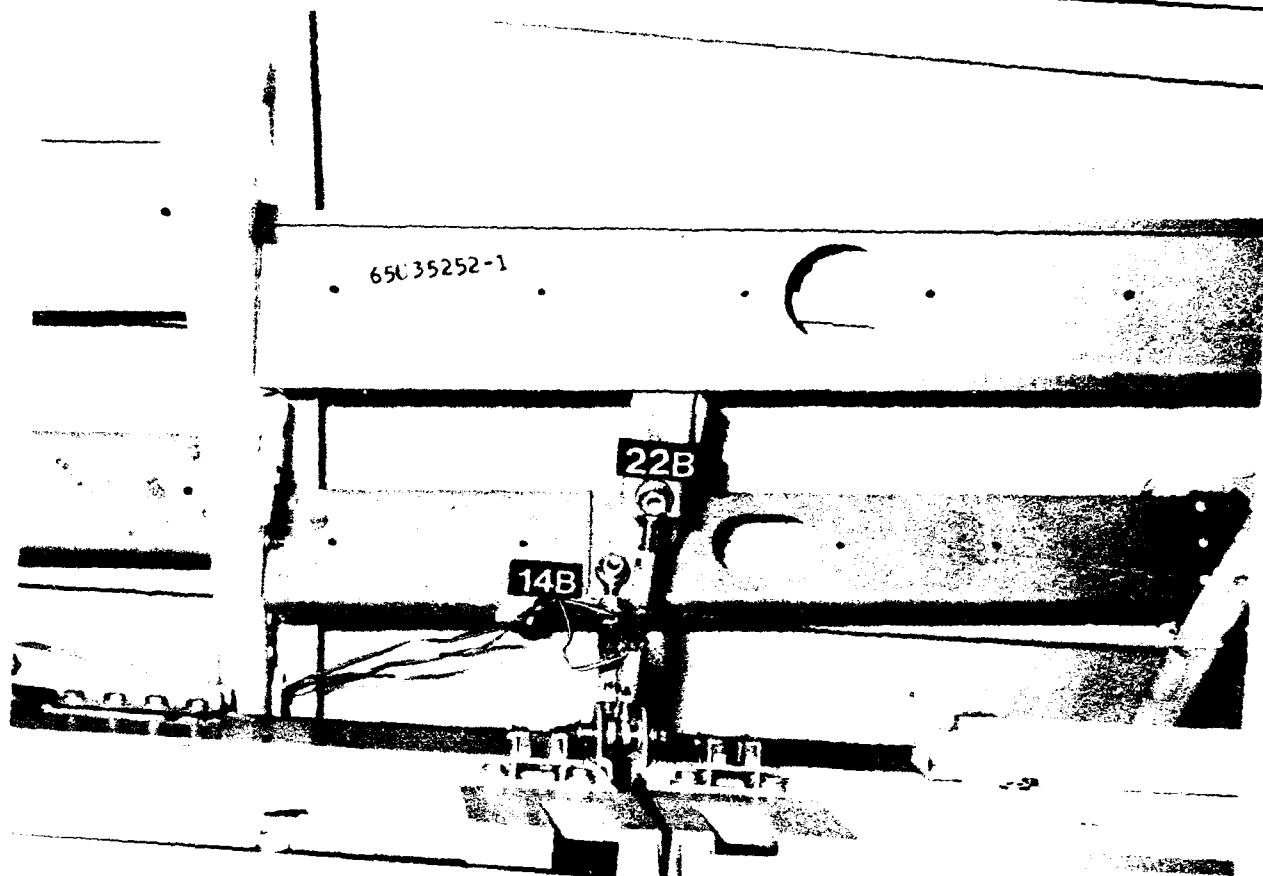


Figure C-12. BIN 'B' LINKS 14 AND 22

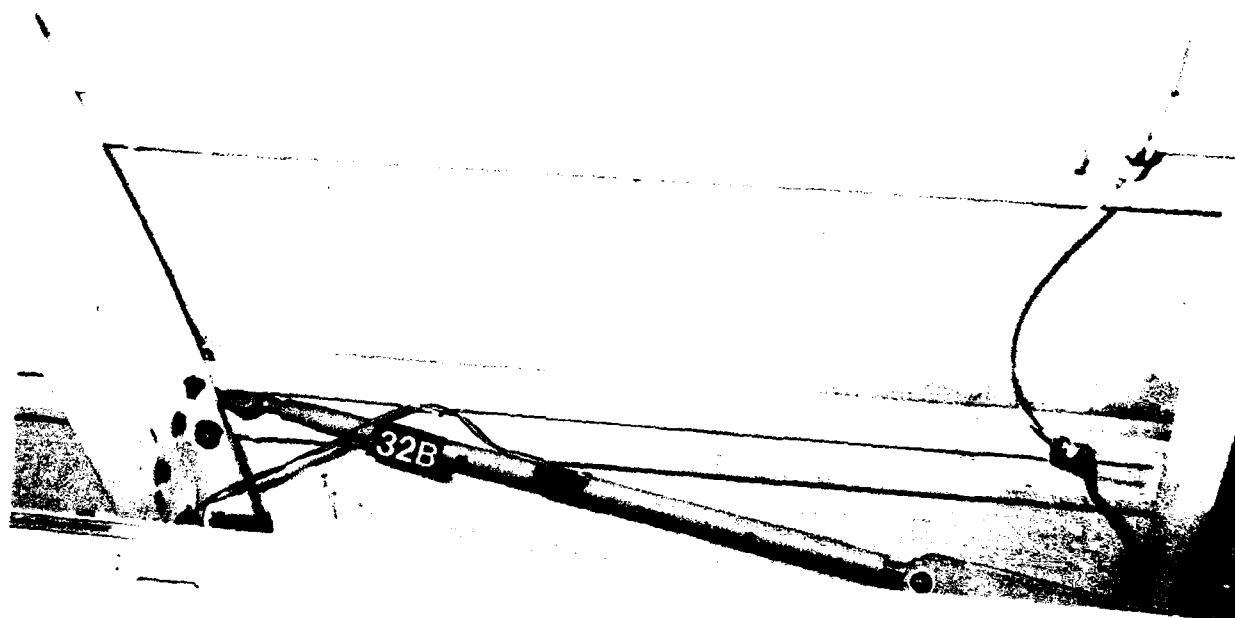


Figure C-13. BIN 'B' LINK 32

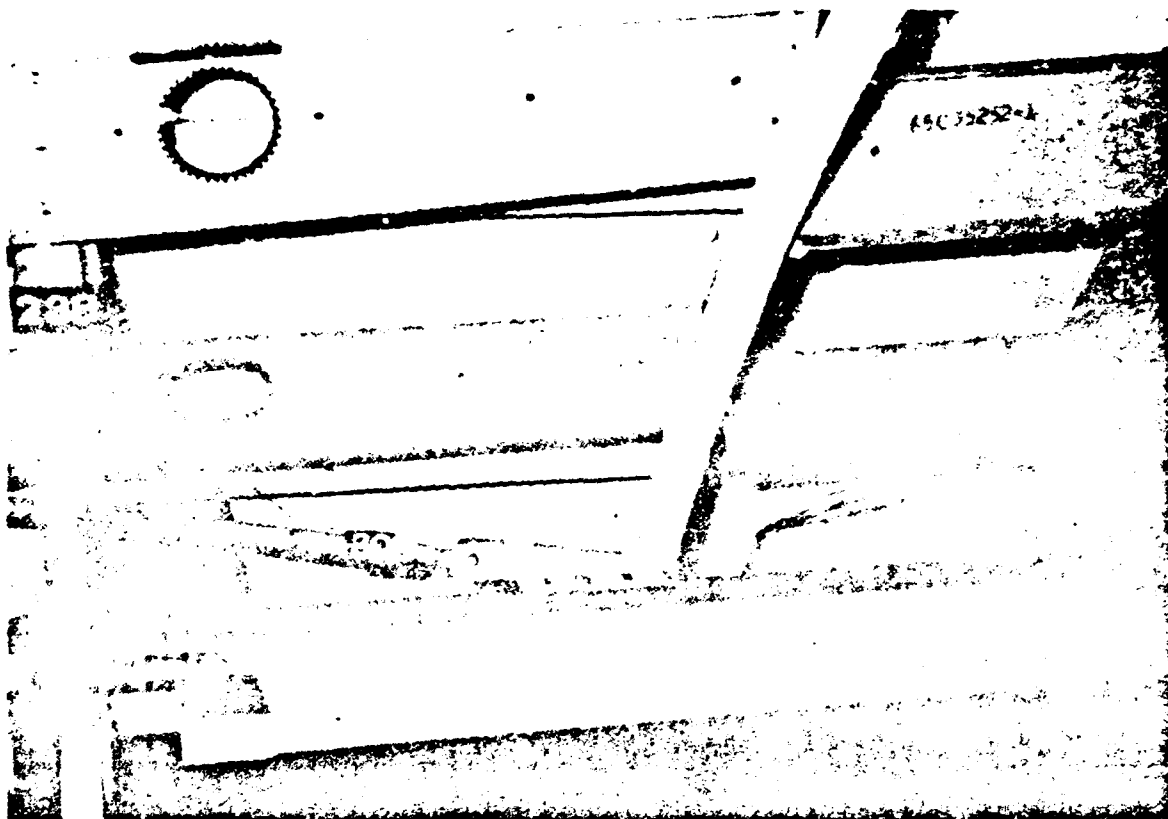


Figure C-14. BIN 'B' LINKS 15, 16, 23, 24, AND 30

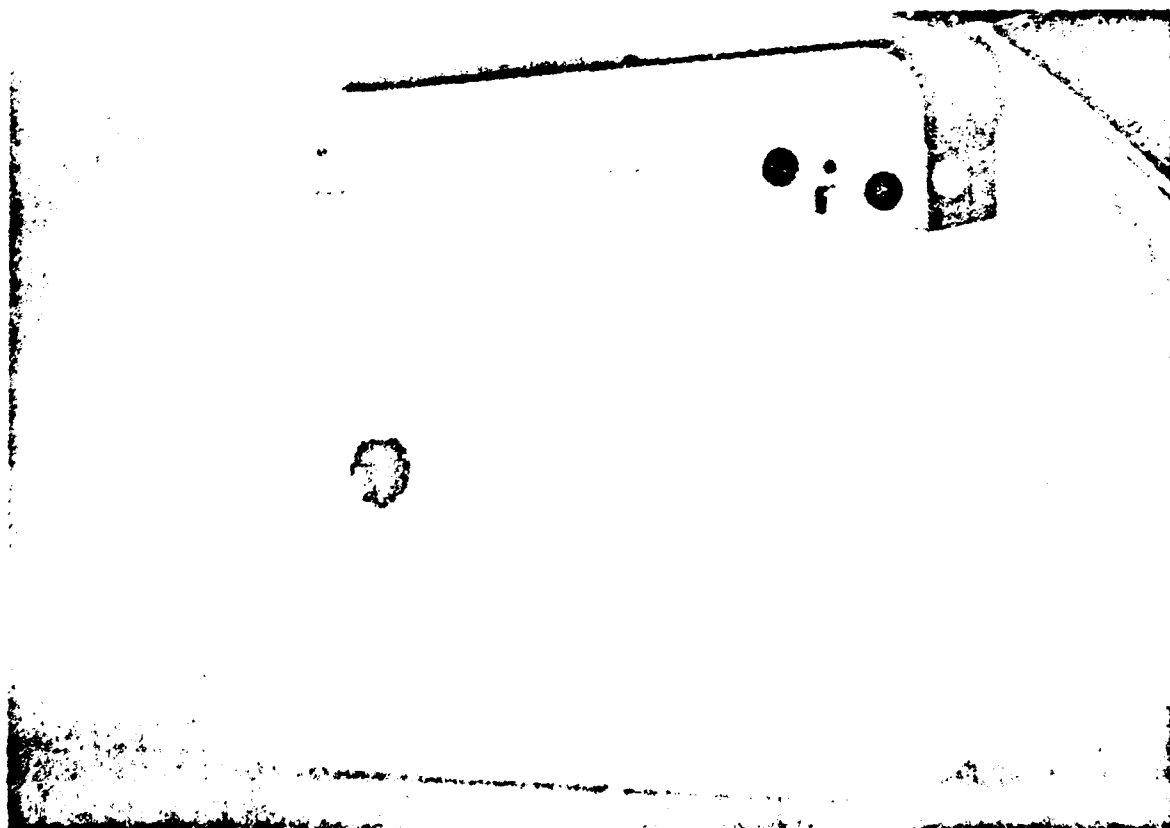


Figure C-15. POST TEST PHOTO OF DAMAGE, 6" BIN FORWARD FANCL

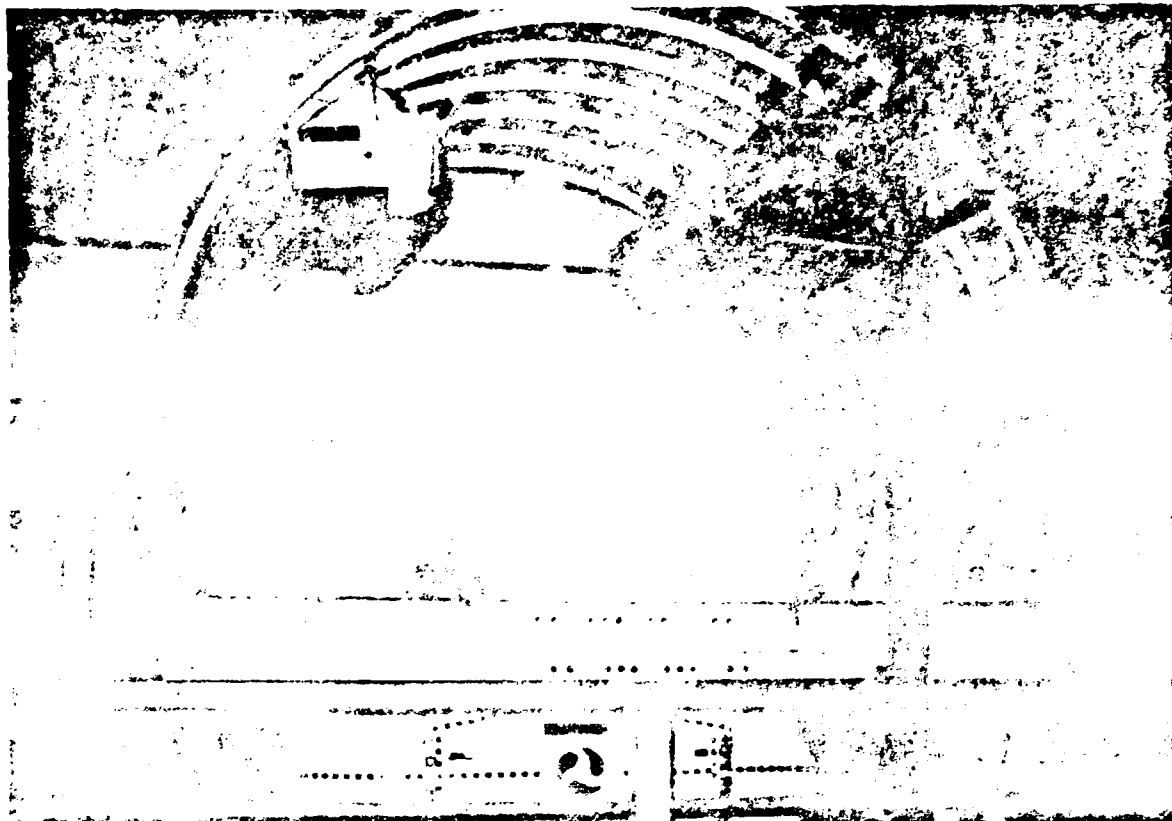


Figure 3-16. FRONT VIEW OF FUSELAGE AND STATIC TEST FIXTURE, TEST OHRC-02

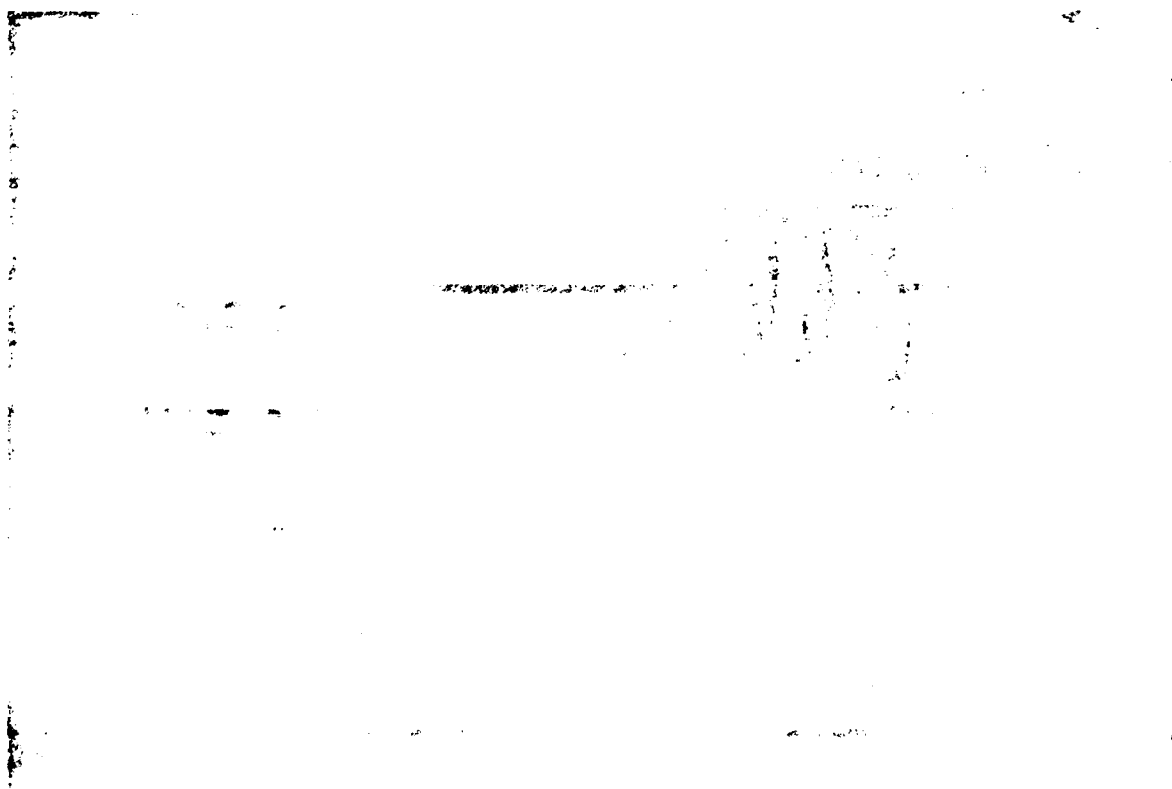


Figure 3-17. S&E TEST OHRC-01, BIN 101 LINK 30 DETACHED

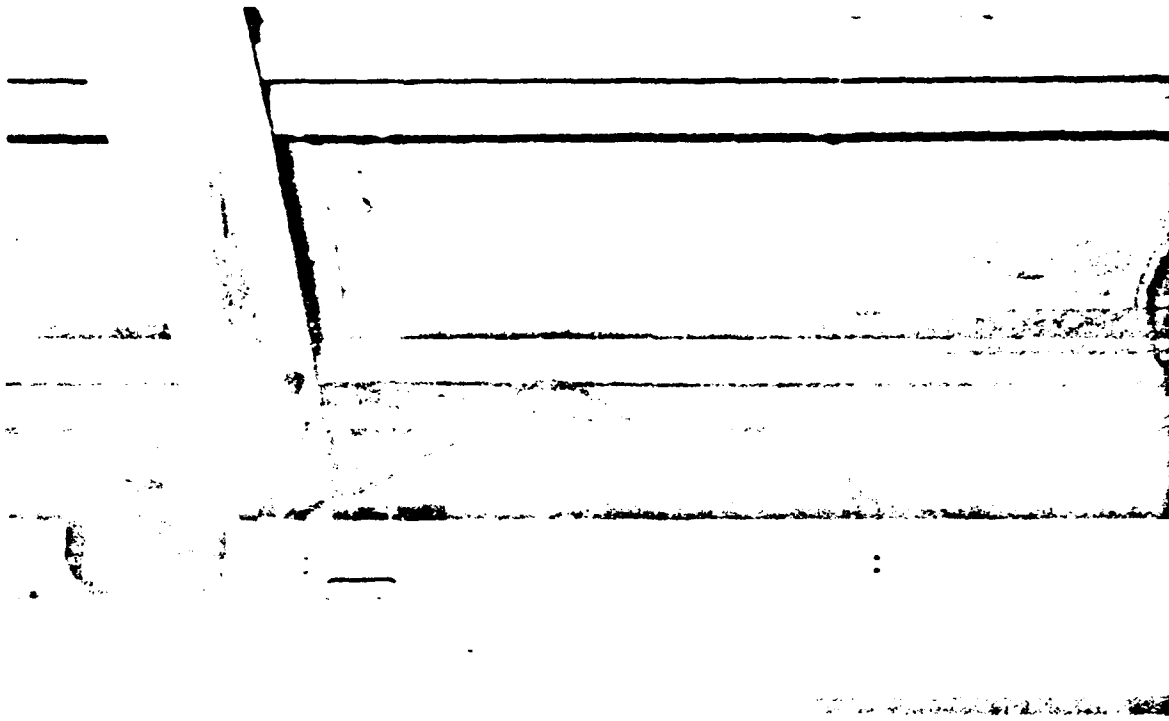


Figure C 16. PRE-TEST OHBC-02, BIN 'B' LINK 32 ATTACHED

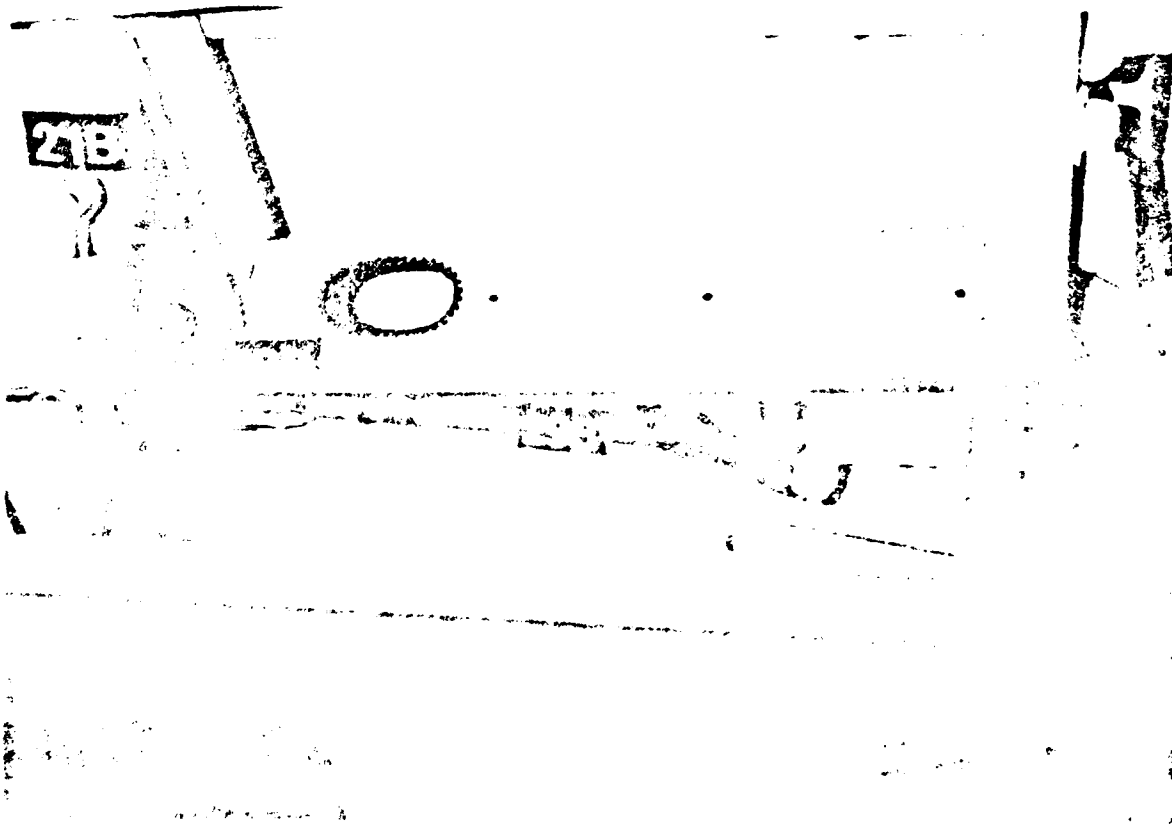


Figure C 17. PRE-TEST OHBC-02, BIN 'B' LINK 32 ATTACHED

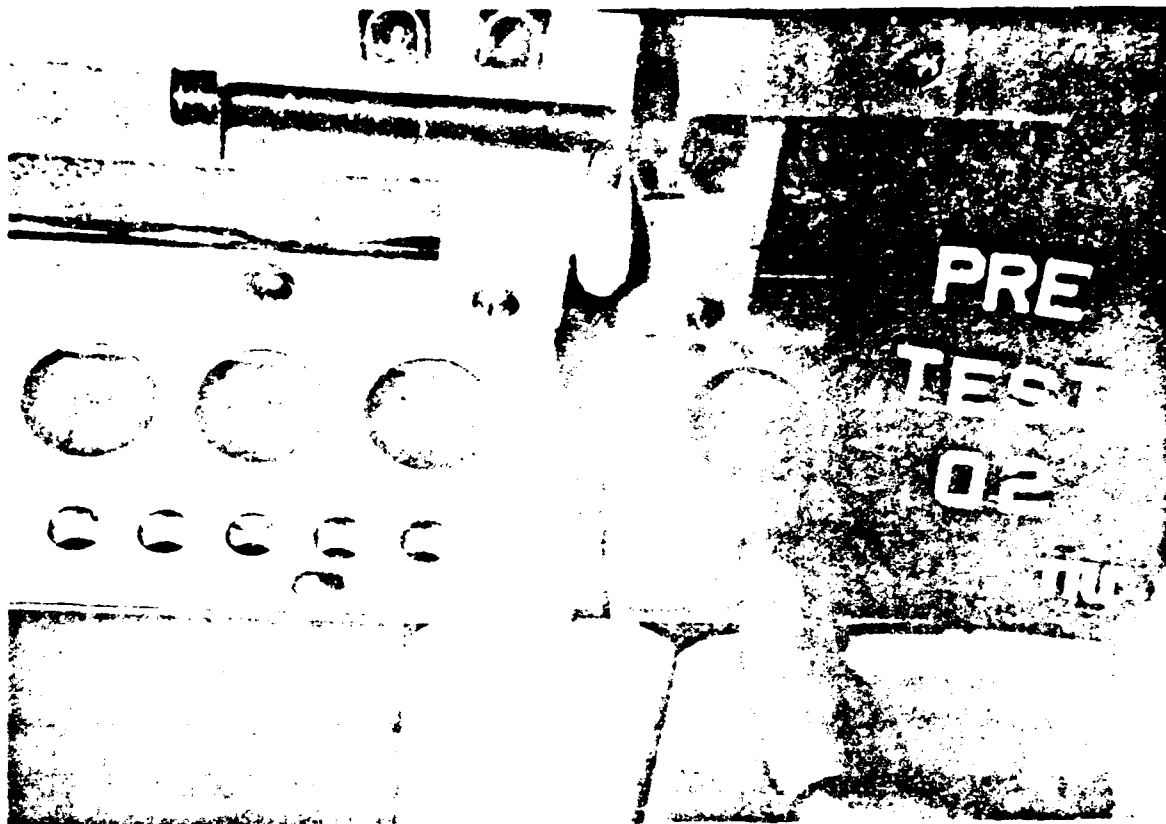


FIGURE 1-10 PRE TEST 02 BIN 'B' INBOARD DEFLECTION INDICATOR
BETWEEN 10" BIN AND REAR 20" BIN

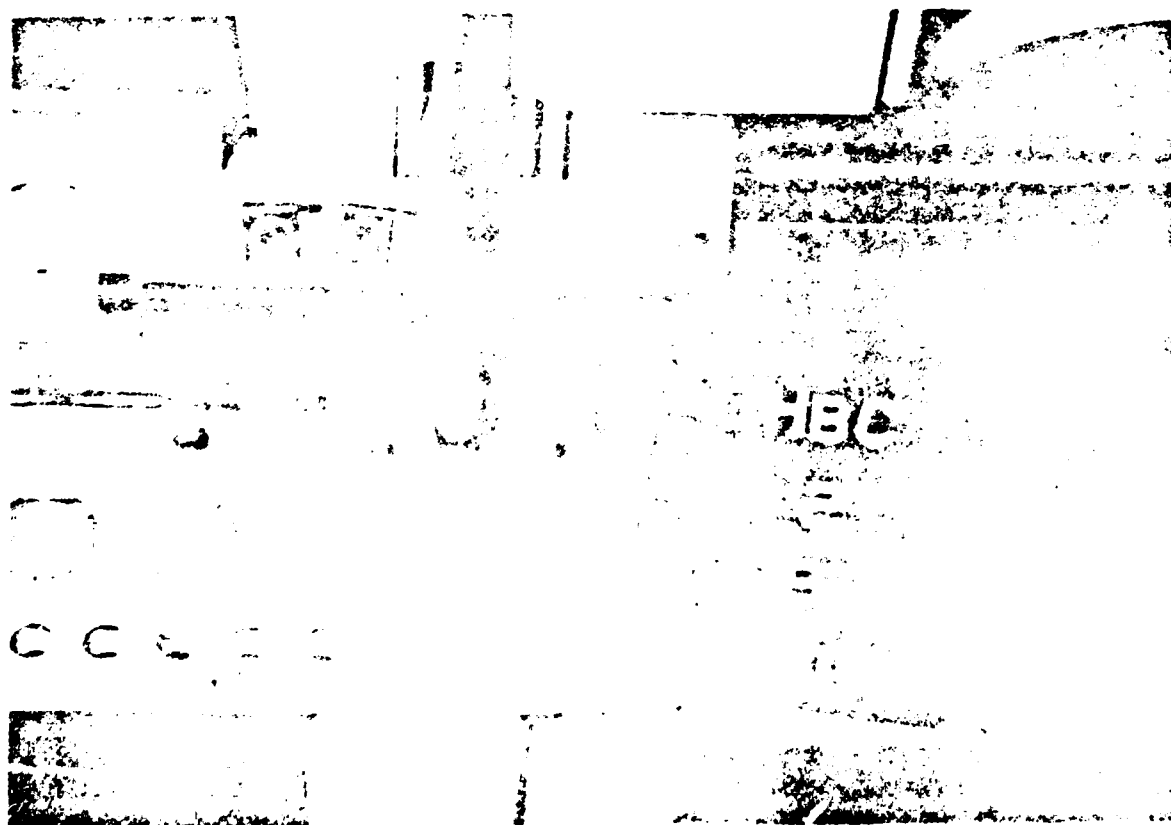
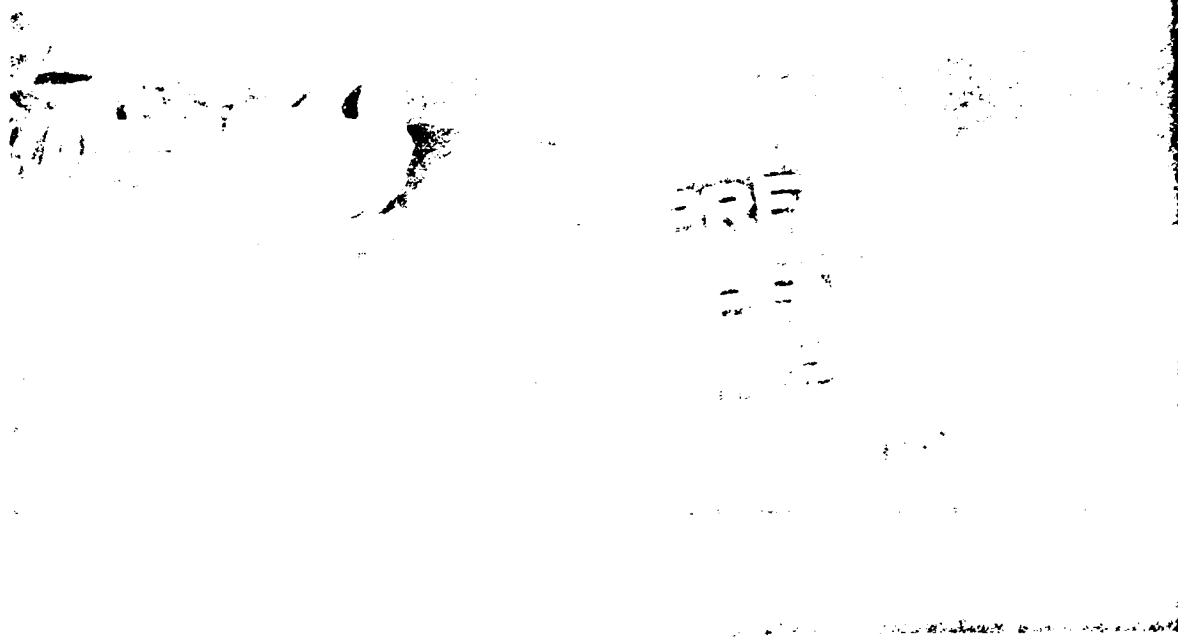


FIGURE 1-11 PRE TEST 02 BIN 'B' INBOARD DEFLECTION INDICATOR
BETWEEN 10" BIN AND REAR 20" BIN



FOR TEST AREA "B" BIN "B" (TRAP) REFLECTION INDICATOR
WITH IN THE "B" BIN AND AREA "B" BIN

FOR TEST AREA "B" BIN "B" (TRAP) REFLECTION INDICATOR
WITH IN THE "B" BIN AND AREA "B" BIN

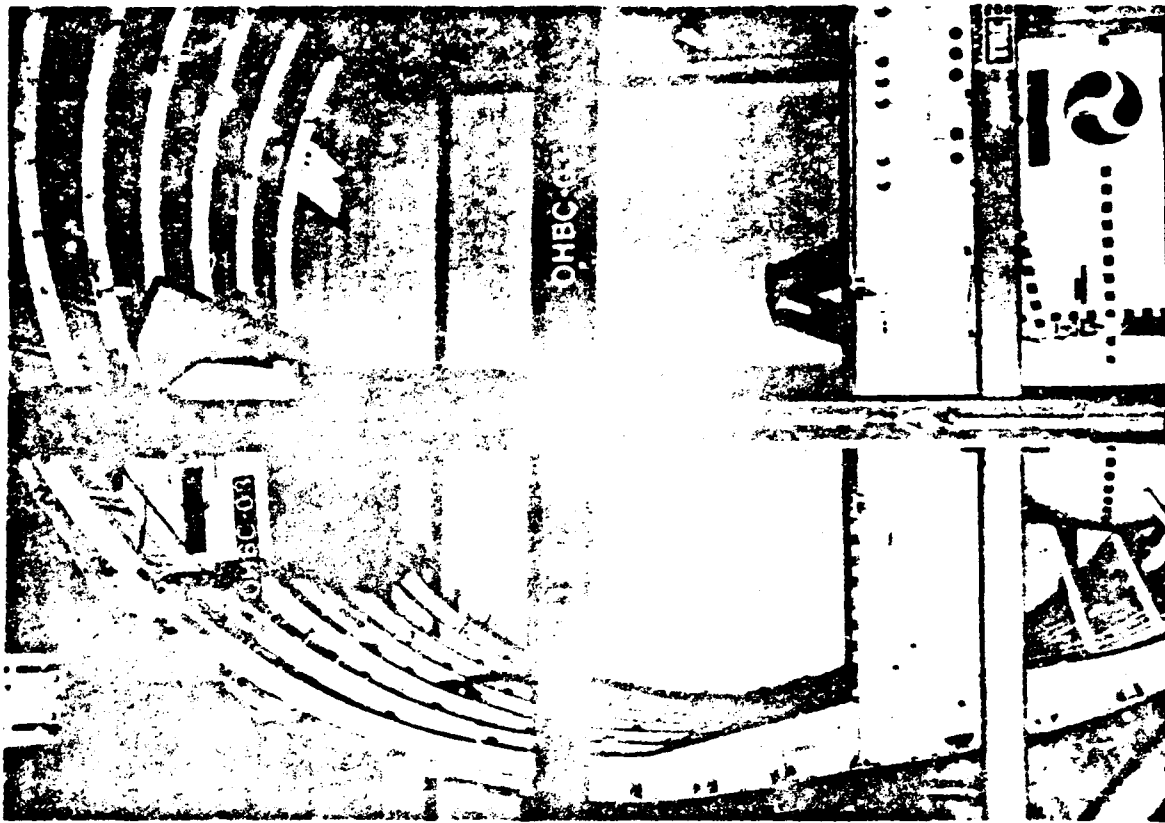


FIGURE C-24 FRONT VIEW OF FUSELAGE AND STATIC TEST FIXTURE, TEST OHBC-03

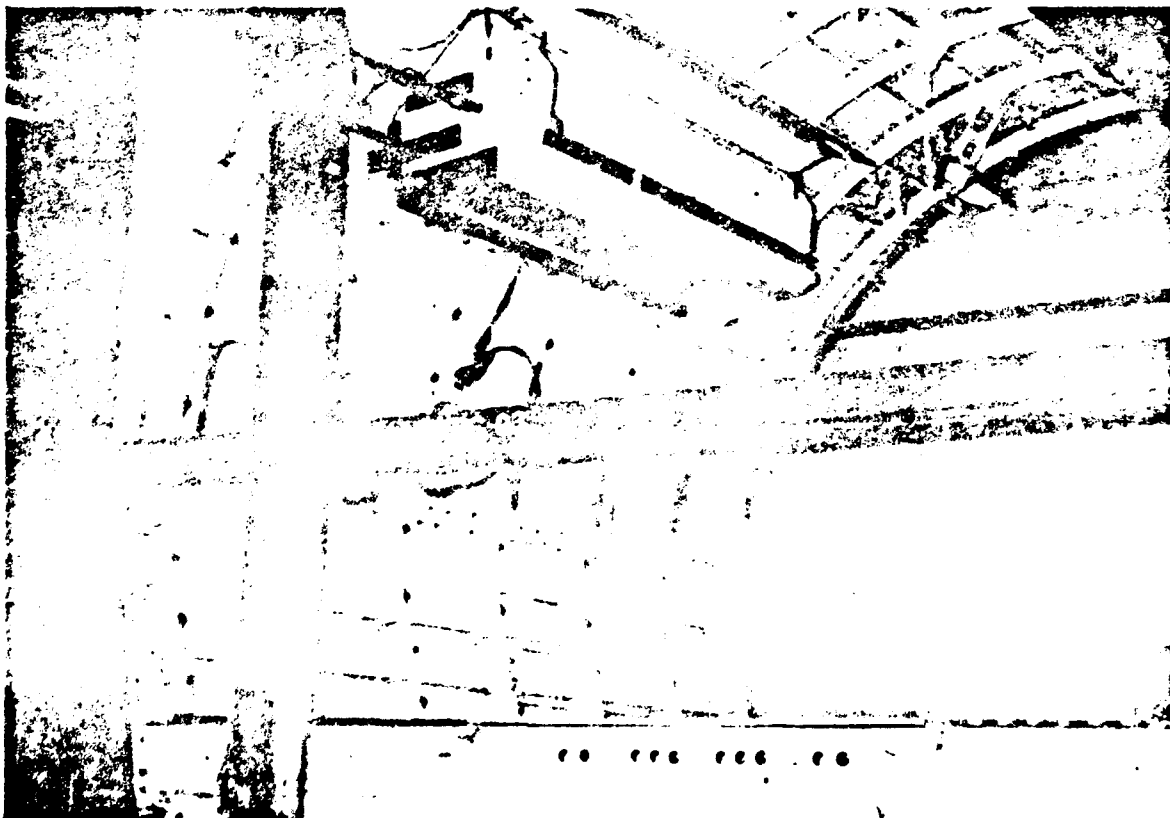


FIGURE C-25 SIDE VIEW OF FUSELAGE AND STATIC TEST FIXTURE, TEST OHBC-03
(C-24)

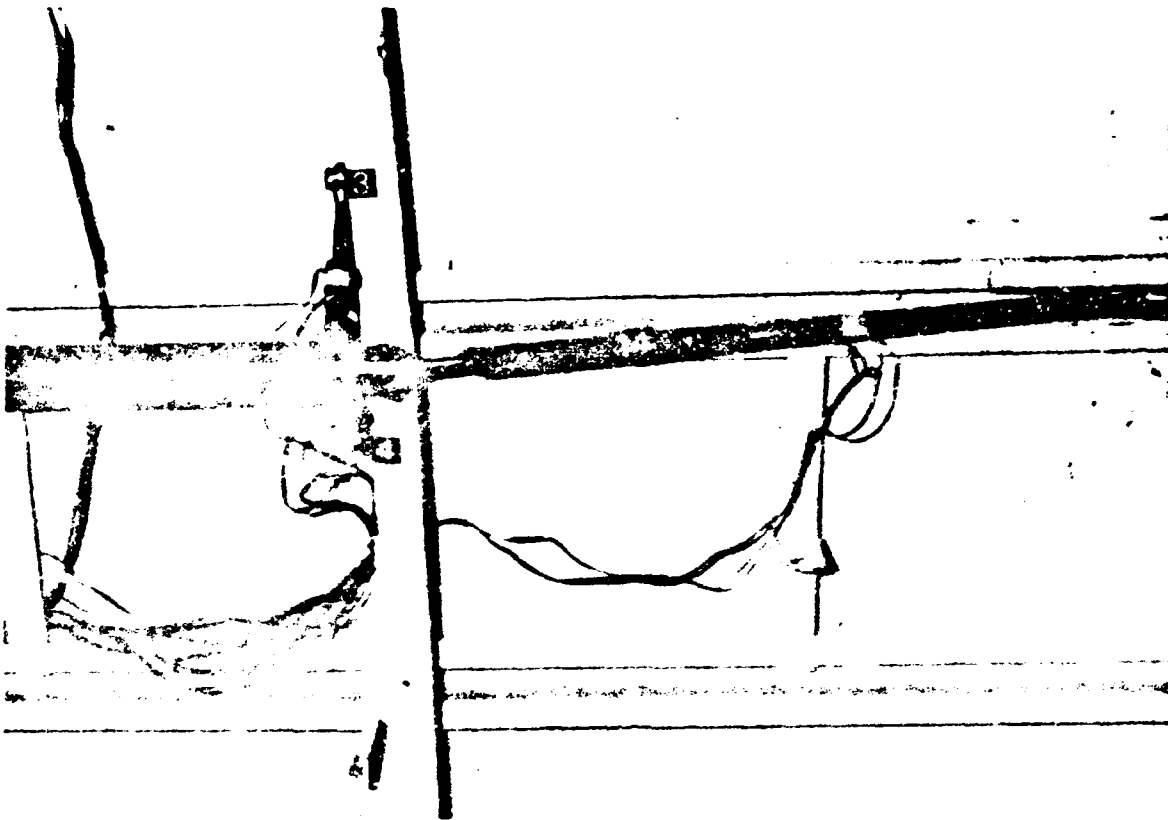


Figure C-26. REAR VIEW BIN 'A' LINKS 3, 4, AND 14 LOCATIONS

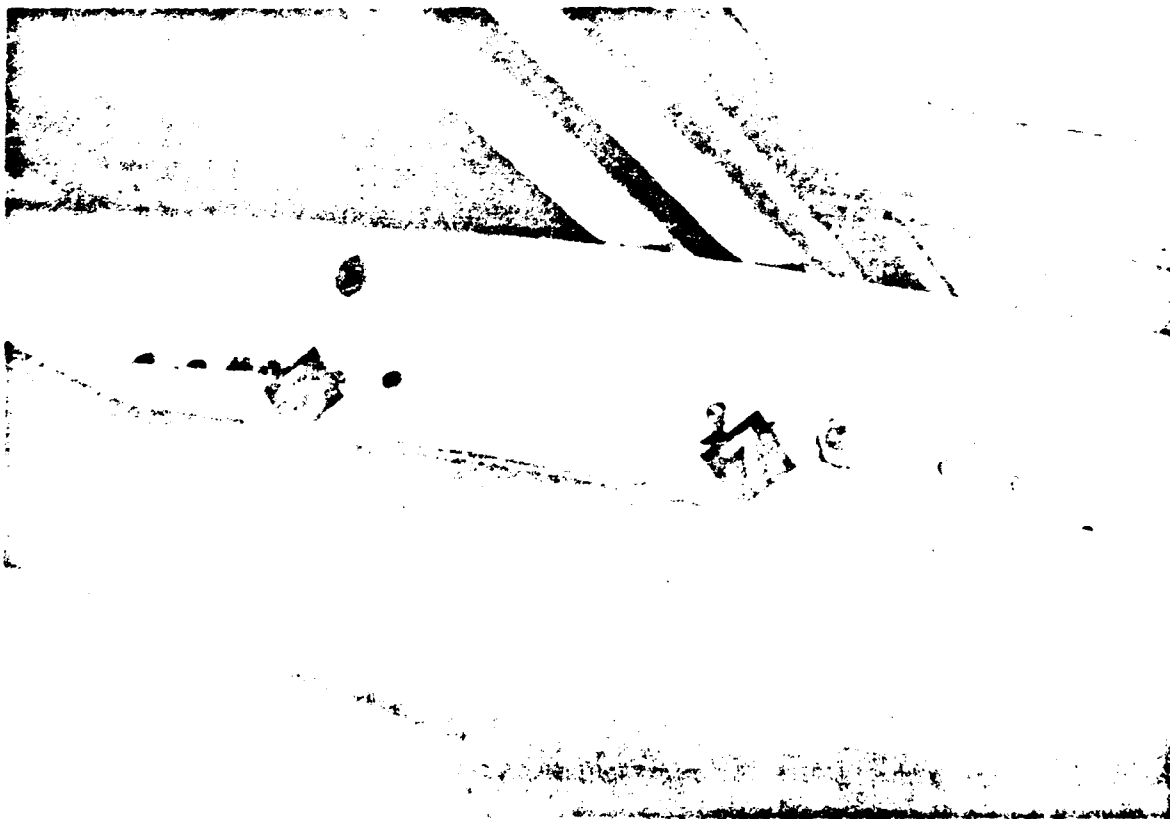


Figure C-27. BIN 'A' LINKS 5 AND 7

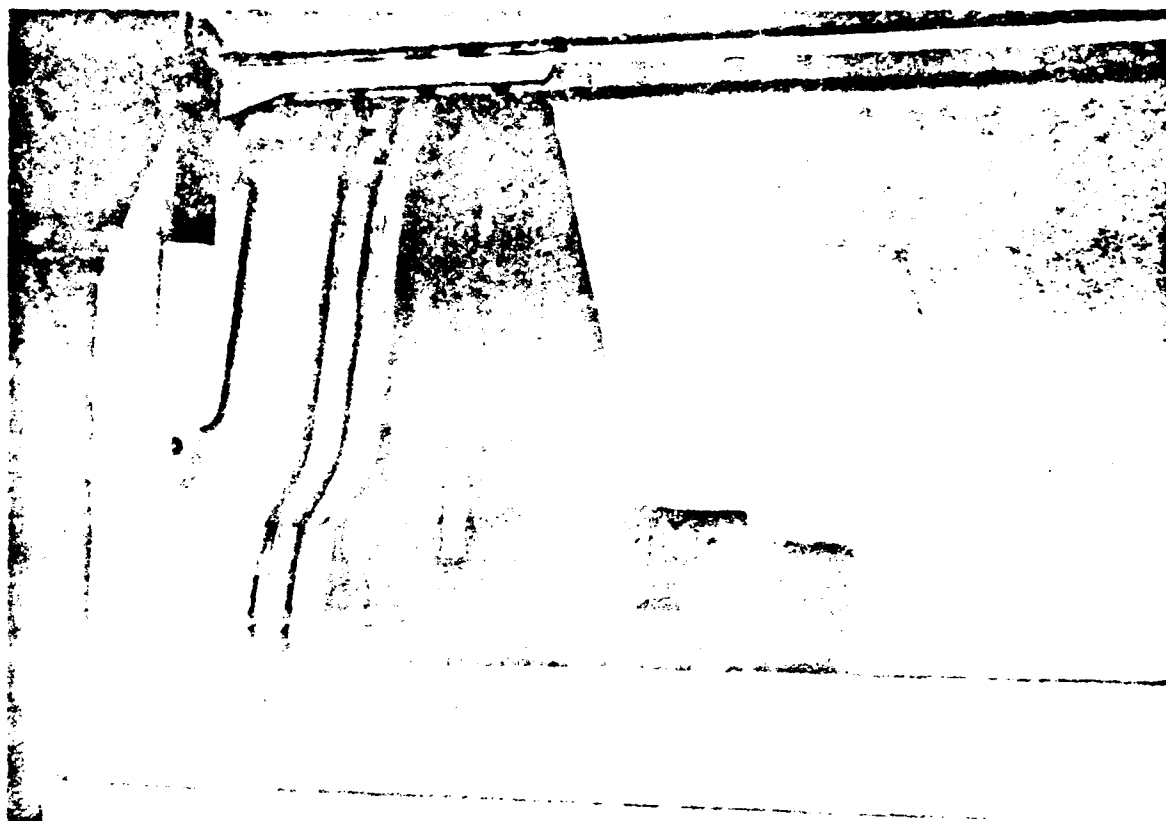


Figure C-23. SIDE VIEW BIN 'A' PLOD SETUP

APPENDIX D

FACILITY DESCRIPTION

LIST OF ILLUSTRATIONS, CONT'D.

FIGURE	DESCRIPTION	PAGE
D-1	TEST AREA	D-2
D-2.	HYGE SHOCK TESTER	D-3
D-3.	HYGE ACTUATOR	D-5
D-4.	METERING PIN AND ORIFICE PLATE	D-7
D-5.	METERING PINS FOR TRIANGLE SHAPE AND CHILD RESTRAINT PULSES	D-7
D-6.	TRC SLED PULSE	D-8
D-7.	TEST SLED	D-9
D-8.	VELOCITY MEASURING SYSTEM	D-9
D-9.	DATA ACQUISITION SYSTEM	D-10
D-10.	DATA PROCESSING SYSTEM	D-10
D-11.	MOTION PICTURE CAMERAS	D-12
D-12	TEST BUCK WITH CAMERAS	D-12
D-13.	MOTION PICTURE PROCESSOR	D-14
D-14.	COMPUTER GRAPHICS	D-15

IMPACT SIMULATOR

General Description

The Impact Simulator is housed in a 25,000-square foot building which is designed and operated for proprietary testing. Data reliability, and accuracy.

The test area is 88 feet wide and 95 feet long, with a deceleration area 35 feet wide and 142 feet long, Figure D-1. A 15 foot clearance above the track exists for tall payloads.

Hyge Description

The Impact Simulator features a 24-inch diameter, Hyge Shock Tester, Figure D-2. The Hyge principle, as applied to safety testing, simulates the deceleration conditions of an impact but in reverse. Prior to an actual crash, a vehicle and its occupants are moving at a constant velocity. At impact, they are decelerated very rapidly. With the Hyge system, the test vehicle and occupants (dummies) are initially at zero velocity. This situation simulates the constant velocity condition prior to an actual crash. The programmed, rapid acceleration, of the Hyge thrust column accelerates the sled with attached test article(s) and produces an impulse similar to that generated during the rapid deceleration of a moving automobile or aircraft during a crash impact. Depending upon the orientation of the test article(s), the crash loads can be applied to any axis.

The system can generate a gross thrust of 750,000 pounds which is capable of accelerating a payload of 10,000 pounds to 71 mph and obtain a peak acceleration of 55 G's. Peak accelerations of 100 G's and velocities of 100 mph can be attained with lighter payloads.

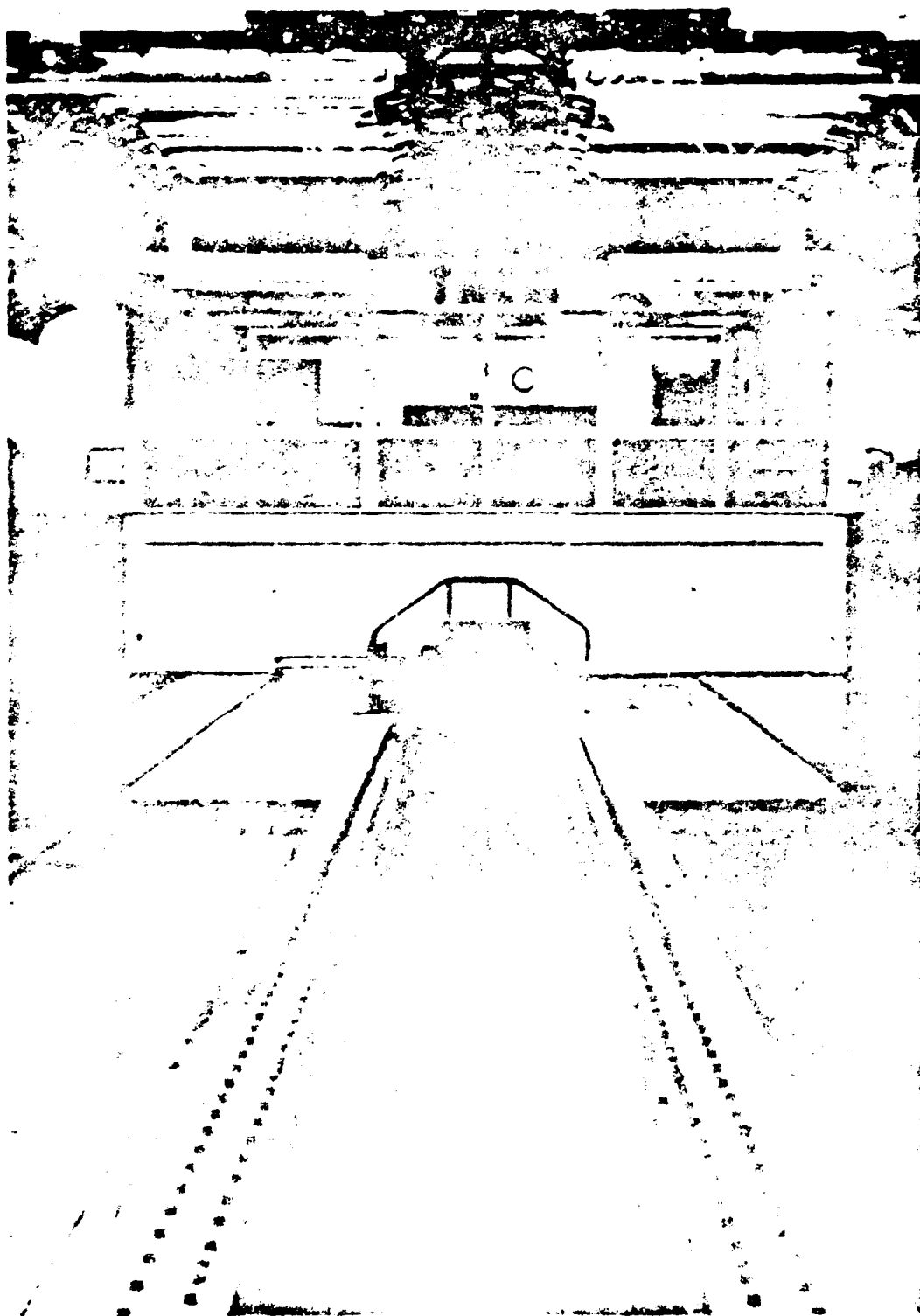


Figure D-1 Test Area

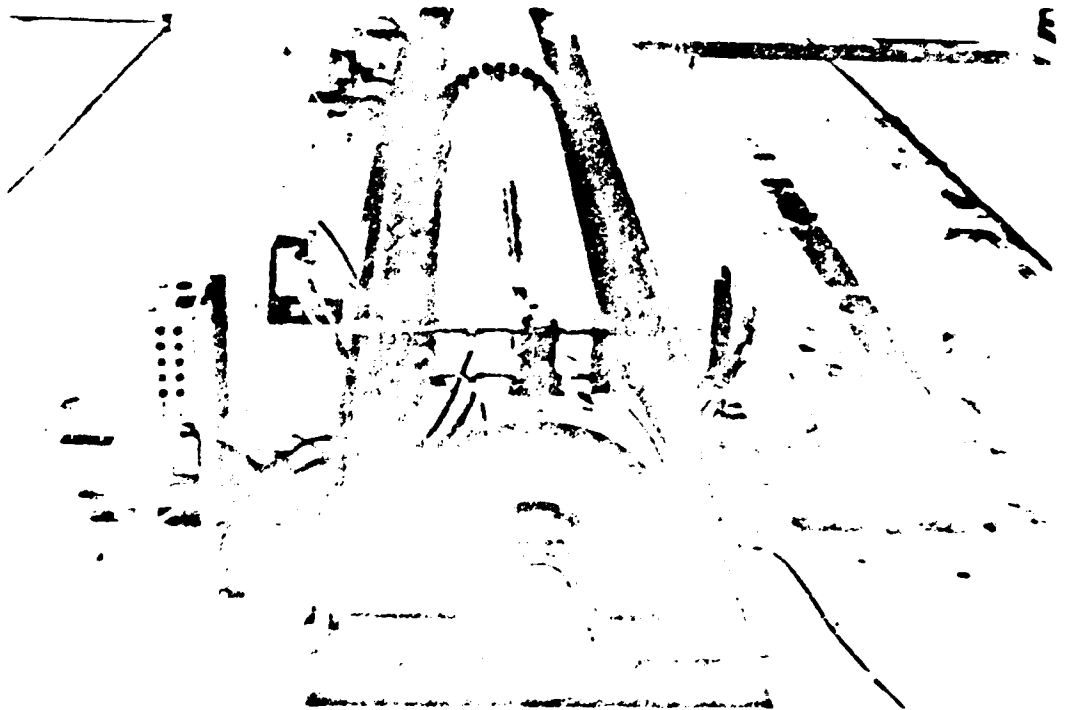
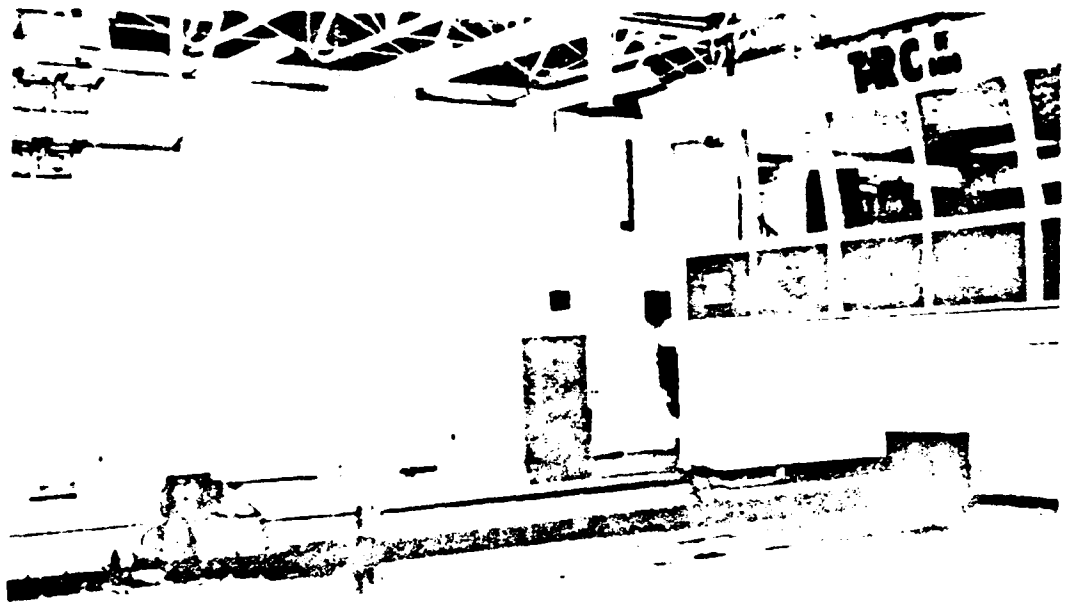
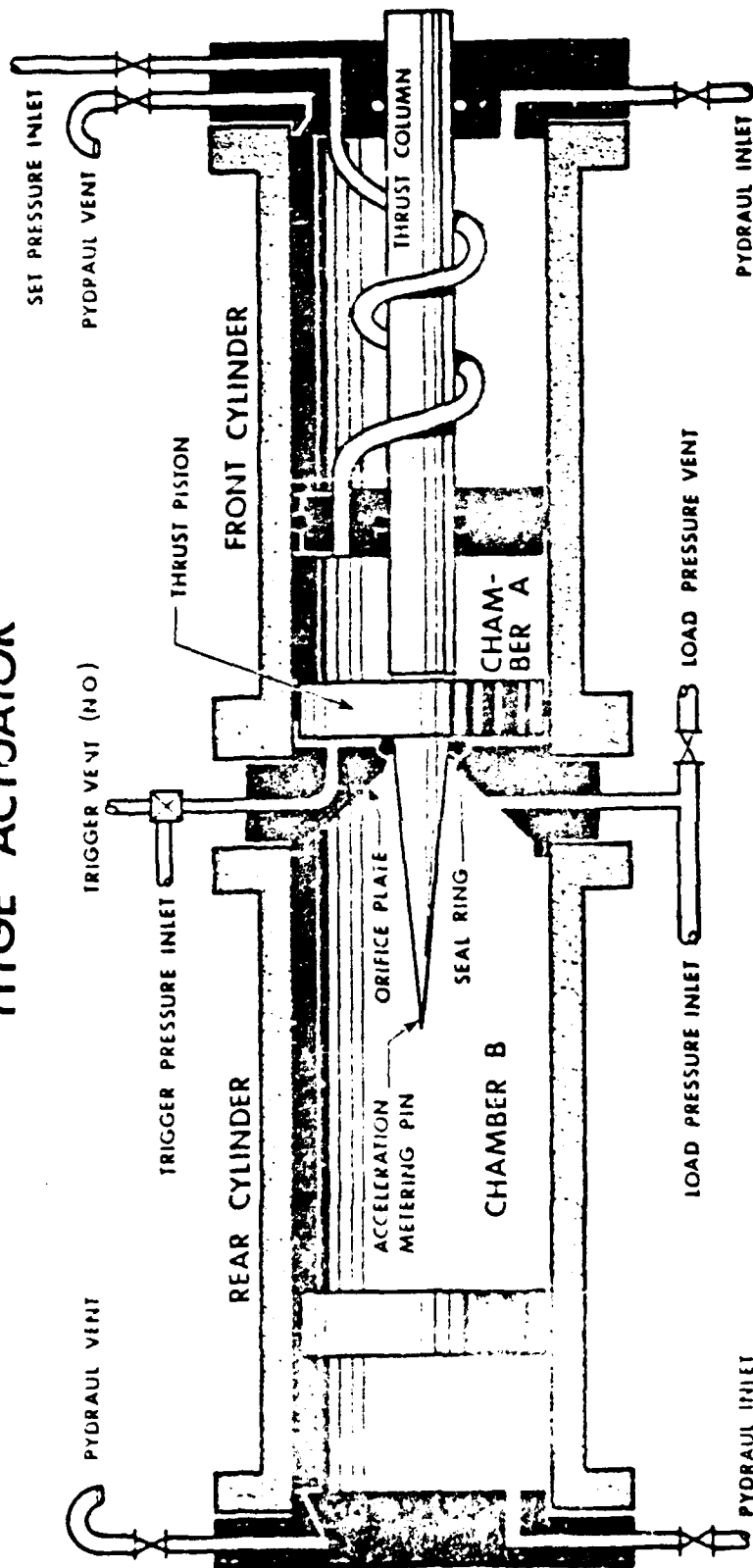


Figure D-2. Large Shock Tester

HYGE ACTUATOR



CYLINDER NET AREAS			
CYLINDER I. D.	REAR	FRONT	ORIFICE
24 IN.	452 SQ. IN.	374 SQ. IN.	50 SQ. IN.

Figure D-3 Hyge Actuator

The system is pneumatically operated and develops its thrust through differential gas pressure acting on the two faces of a thrust piston in a closed cylinder, Figure D-3. Compressed air is supplied to the load chamber by two 100 h.p. compressors. The main cylinder is separated into two chambers (front and rear) by an orifice plate. Each chamber utilizes a floating piston to vary the volume of the compressed gas within the chamber. The volume is changed by pumping "Pydraul" into or out of the cylinder, thereby, varying the position of the floating piston.

NOTE: "Pydraul" is a fire resistant, hydraulic-type fluid used to reduce the possibility of diesel explosions due to the high surge pressures generated when decelerating the thrust column.

In operation, a relatively low gas pressure in Chamber A forces the thrust piston against a seal ring seated on the orifice plate on the rear side of the thrust piston. Only the smaller area within the seal is exposed, through the orifice opening, to the gas pressure in Chamber "B". The ratio of the net areas of the thrust piston front and rear surfaces, which are exposed to the gas pressures in the chambers, is 7:1 with the front being the larger. This implies that as long as the pressure in the rear chamber is no more than seven times larger than the pressure in the front chamber the system is in equilibrium. To provide a margin of safety, the pressure ratios are never greater than 6:1.

In preparation for firing, compressed gas is introduced into Chamber B until the forces on the thrust piston are equalized. A low volume trigger pressure is injected which upsets the equilibrium, opens the seal at the orifice, moves the thrust piston away from the orifice plate, and instantly exposes the entire rear area of the thrust piston to the gas pressure in Chamber B. A controlled thrust on the piston results. Transmitted by a thrust column, this limited-duration thrust acts upon the test specimen to produce an accurately predictable acceleration or velocity.

Acceleration is governed by a metering pin which projects through the orifice into Chamber B. The contour of the pin meters the flow of gas through the orifice, regulating the acceleration and making the utilized thrust precisely repeatable, Figure D-4. By varying the volumes and pressures in Chambers A and B, the pulse amplitude and duration generated by a metering pin can be modified.

A computer program is utilized to aid in the design of metering pins. The program was used to design the pins to produce the triangular-shaped pulse for the testing of General Aviation aircraft seats, and the input pulse for child restraint testing per Federal Motor Vehicle Safety Standard 213, Figure D-5.

Illustrations of the basic wave forms generated by metering pins currently in our inventory are shown in Figure D-6.

Test Sled

The test sled has a top surface which is five feet wide and twelve feet long, Figure D-7. It weighs approximately 3,600 pounds and is designed to carry a maximum payload of 10,000 pounds. Pneumatic brakes provide up to 24,000 pounds drag force on the sled without causing deceleration irregularities. The brakes may be applied prior to the test to provide a smooth transition between the acceleration and deceleration phase, or they may be applied after the acceleration phase is completed. The sled is instrumented with accelerometers mounted to the center nose to measure acceleration in the longitudinal direction. The sled velocity is obtained by two methods: (1) a real time measuring system which utilizes a 12 foot long film strip, with precisely marked intervals, attached to the lower surface of the sled, Figure D-8. The film strip passes through a photo detector/light source with the output of the detector coupled to a "frequency-to-DC" converter whose output represents the sled velocity, (2) integration of the sled acceleration pulse.

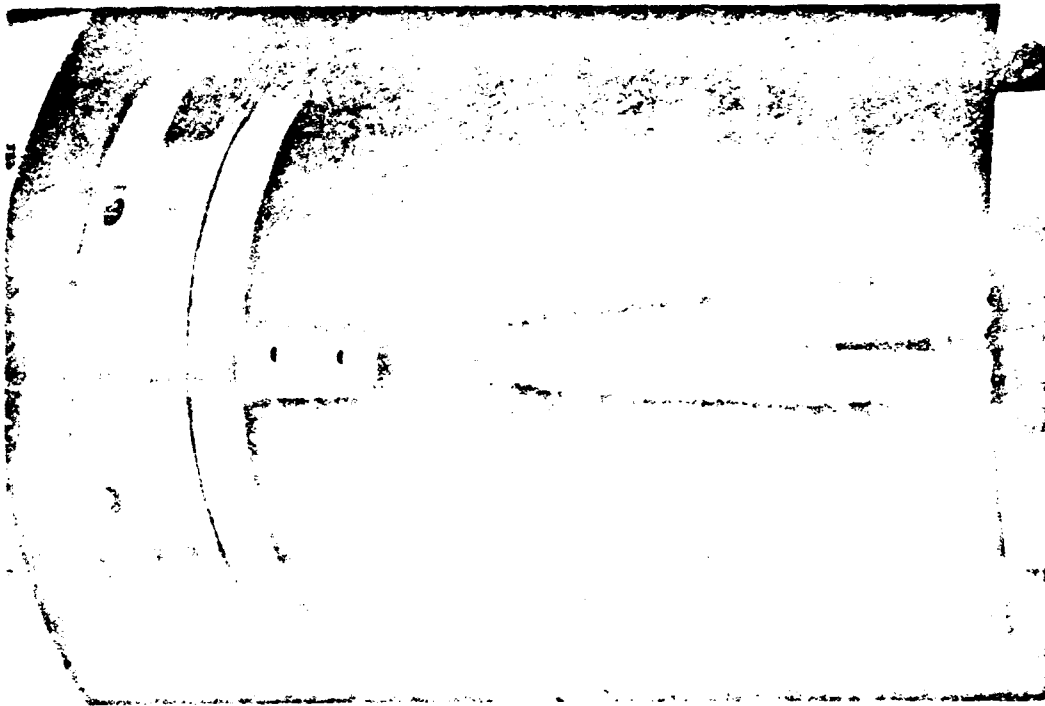


Figure 1. Interior of vehicle and driver's side.

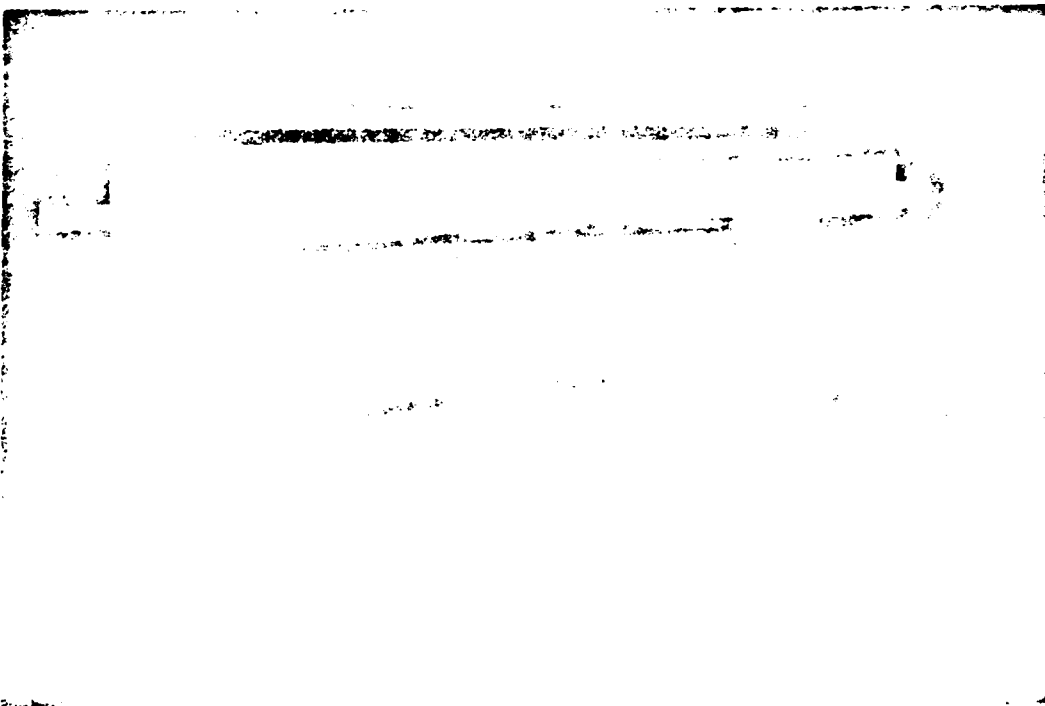
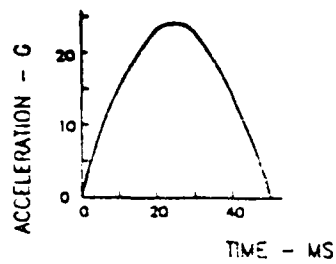
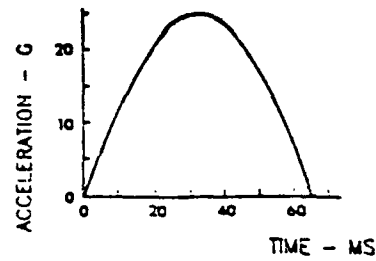


Figure 2. Interior of vehicle and driver's side and Child Restraint Poles.

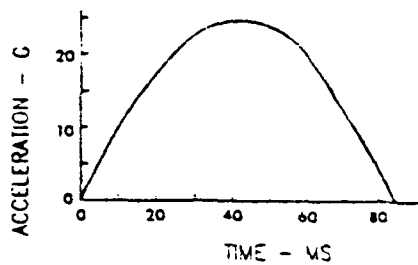
TRC SLED PULSES



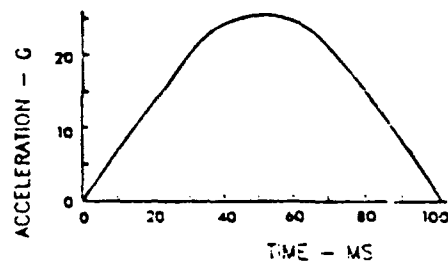
50 MS 1/2 SINE PIN



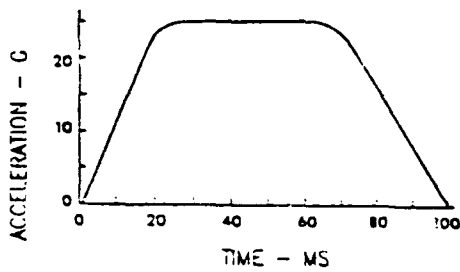
65 MS 1/2 SINE PIN



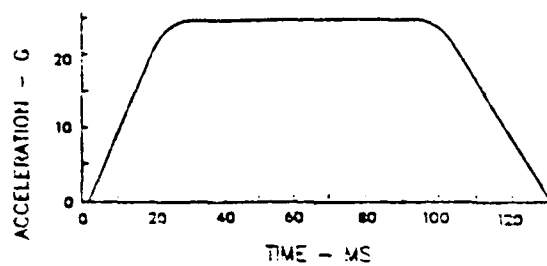
85 MS 1/2 SINE PIN



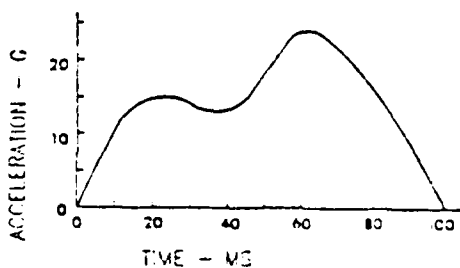
100 MS 1/2 SINE PIN



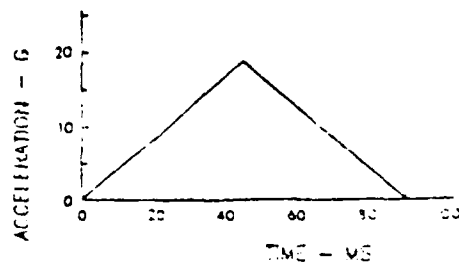
100 MS SQUARE PIN



130 MS SQUARE PIN



DOUBLE HUMP PIN



TRIANGLE PIN

Figure D-6.

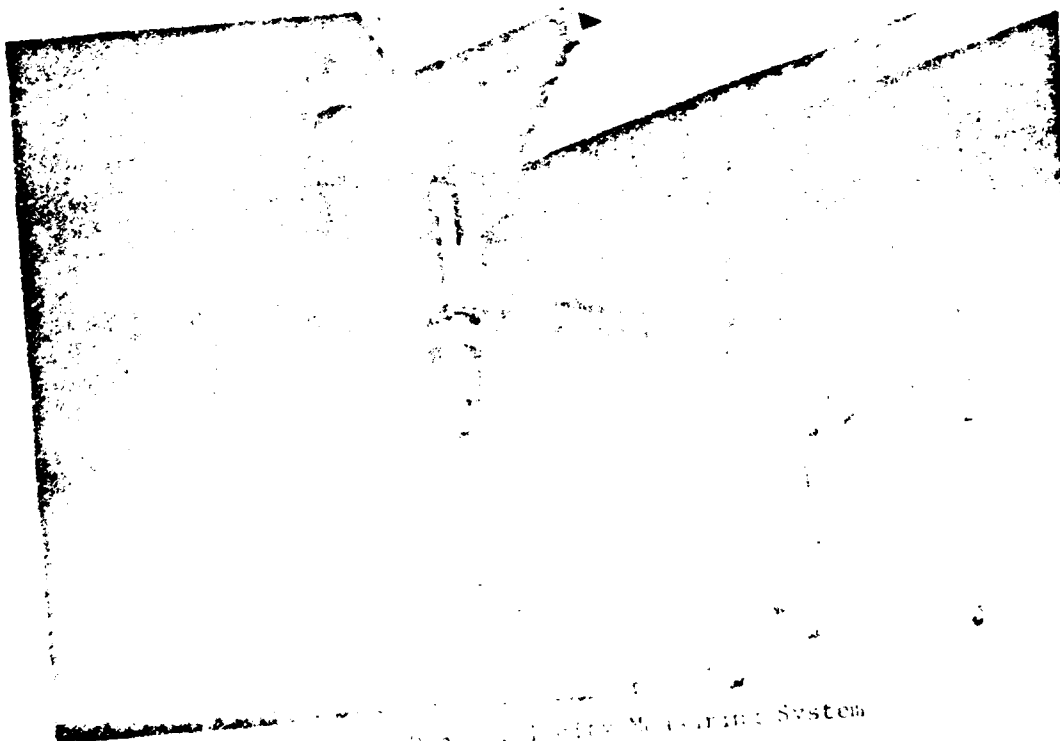
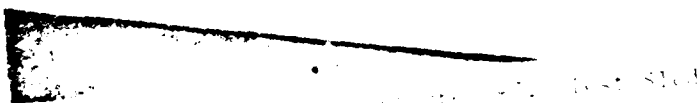
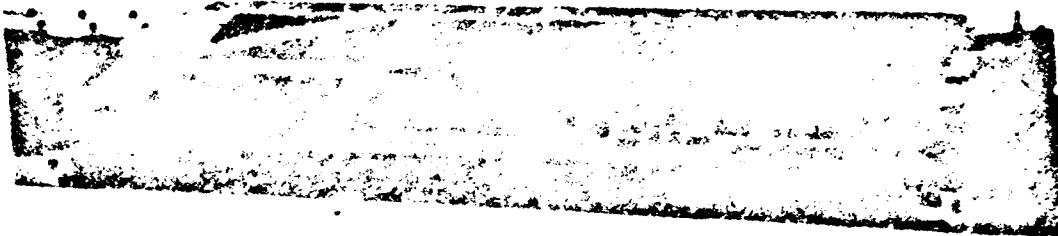


FIGURE 2-5. ... Measurement System

Data Acquisition

The data acquisition system has the capacity of simultaneously acquiring and recording, on magnetic tape, 56 data channels from sensors requiring signal conditioning, Figure D-9. Each data channel meets the requirements of SAE Recommended Practice, J211B.

Each sensor is connected, via umbilical cable, to a signal conditioner located in the control room. The signal conditioners supply excitation voltage, amplification, filtering, and remote-controlled insertion of the shunt calibration resistors. The outputs of the signal conditioners are multiplexed and recorded on tape recorders. The analog signals are recorded, unfiltered, on one inch magnetic tape at 60 inches per second. IRIG "B" code is generated and recorded on each magnetic tape to aid in data processing.

Immediately preceding each test, all data channels are checked. After proper balancing of each channel, shunt calibration resistors are inserted, electronically, for each sensor and recorded on the magnetic tape.

During the test event, selected data channels are recorded on an oscillograph to provide real time verification of the test data. Twelve (12) channels of data can be presented on the oscillograph at the time of the test.

Data Processing

The data processing system includes the analog to digital convertor and the computer with its associated peripherals, Figure D-10.

The analog-to-digital convertor is a 16-channel system with each channel having a simultaneous sample and hold amplifier. The digitizing rate is software-selectable with a maximum throughput of 160,000 samples per second. The computer is a VAX 11/780, 32 bit processor, with 8 megabytes of main memory.



Figure 1. Aerial view of the plant.

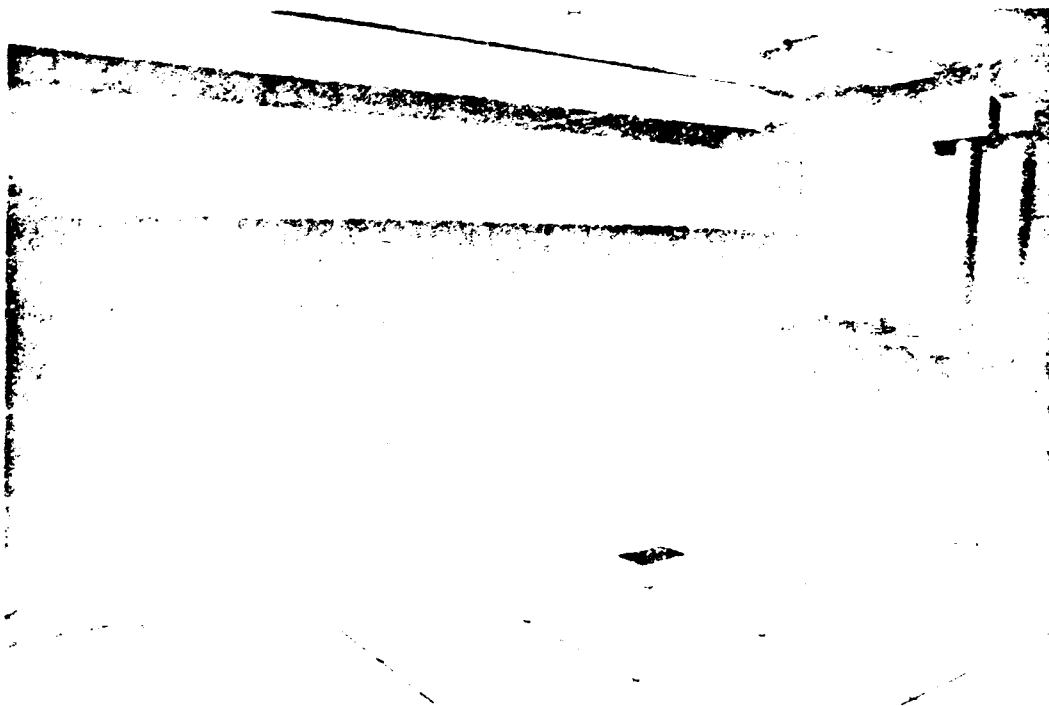


Figure 2. Ground-level view of the plant.

Peripheral equipment includes the following:

- o Model RM05 megabyte hard disk
- o Model RA81 456 megabyte hard disk
- o Model RX02 dual floppy disk
- o Model TU77 tape transport
- o Model 7221T H-P eight pen plotter
- o Floating point processor
- o Thirteen (13) terminals including a Model VT105 waveform graphic terminal

Analog and/or digital filtering of the data can be performed. The filters conform to the Society of Automotive Engineers Recommended Practice J211. The digital filter types include Butterworth, Tchebycheff, and Elliptical. The number of poles can be varied from one to ten. Phaseless filtering can also be accomplished with either of the filter types.

Routine calculations include Head Injury Criteria (HIC), resultants from orthogonal measurements of accelerations forces or moments, thorax (three ms clip) acceleration, the proposed lower leg injury criteria for the Hybrid III Dummy, and pass/fail criteria for dummy calibrations.

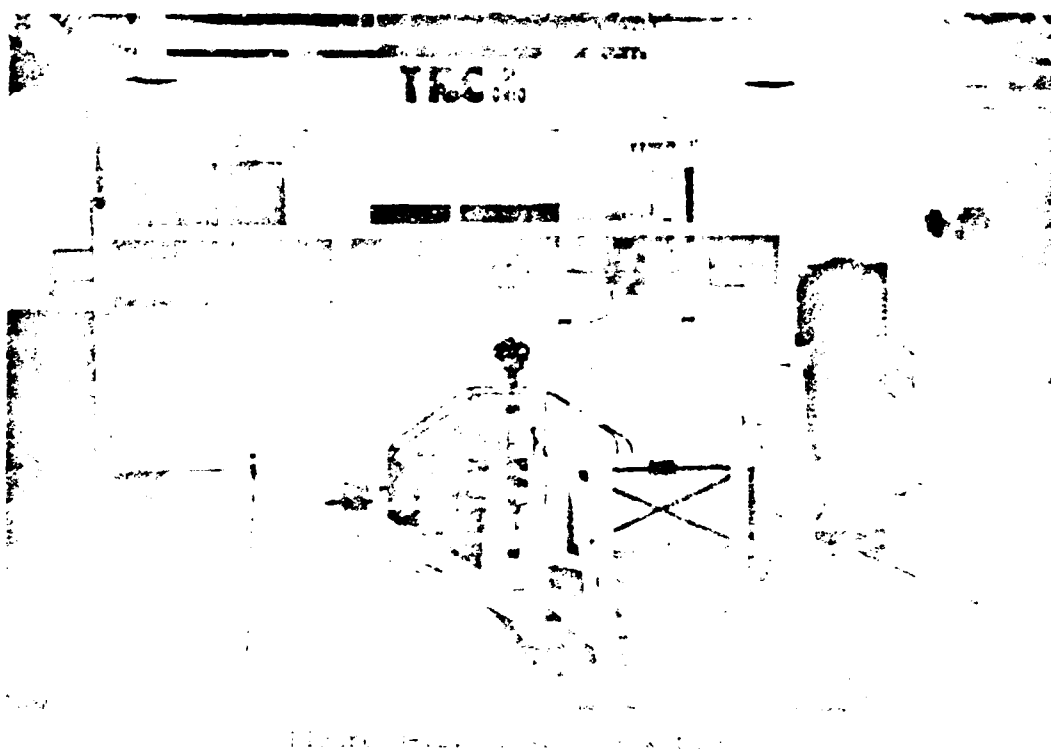
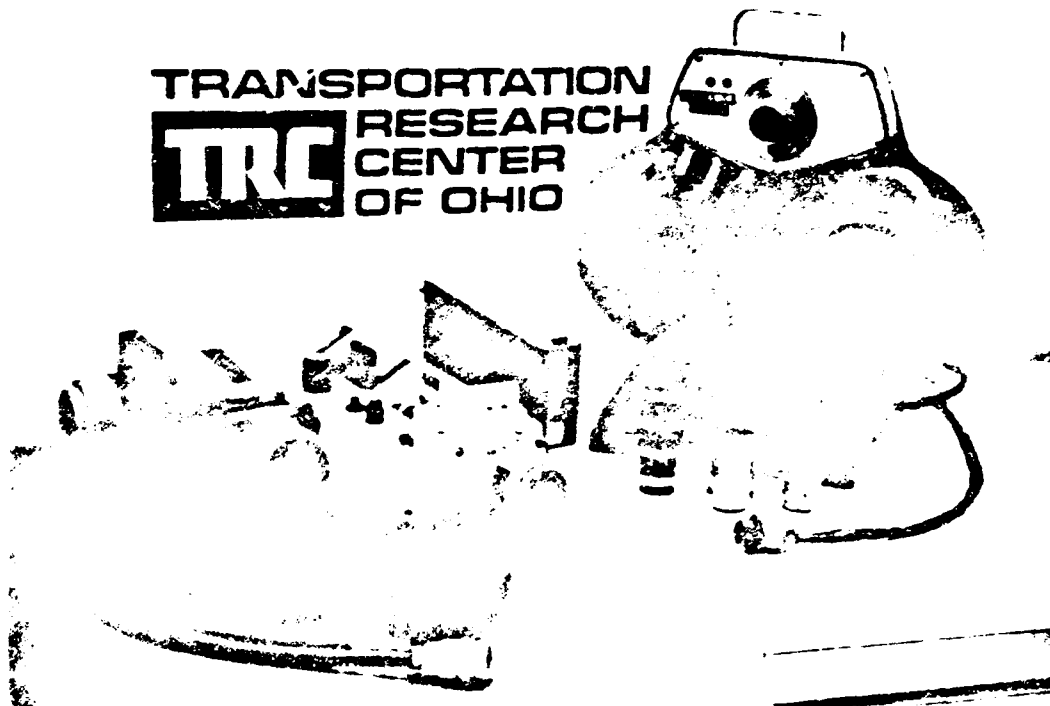
The data is presented in tabular and/or graphic form and also on magnetic tape, if desired. Various types of tape formats are available.

Photography

High-speed motion picture cameras are employed to provide slow motion (1000 fps) coverage of each test, Figure D-11. Higher or lower frame rates can be selected. Five onboard and four offboard cameras, with lenses ranging from eight to 50mm, can be utilized to provide side, oblique, frontal, rear, and overhead views, Figure D-12. Real time (24 fps) motion picture cameras, a video tape system, and 35mm documentary cameras are available.

There are 296 1,500 watt Tungsten-Halogen lights that provide sufficient lighting for motion picture photography at 1000 frames per second. Auxiliary lights can be mounted onboard the sled for test articles which shield the overhead lights from specific areas of interest.

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Film processing for the 16mm color motion picture film, (VMF-1 process), Figure D-13, and 35mm color documentary film (C-41 process) are performed in the photography laboratory located in the Impact Simulator building. Black and white 35mm film can also be processed. The laboratory is equipped for editing and titling the motion picture film, as well as, enlarging and printing color and/or black and white photographs up to 16 by 20 inches. Proof sheets, slides, and view graphs are available.

Schematics, illustrations, and/or computer generated graphics, Figure D-14, can be provided for test reports, publications, proposals or other requirements.

